

**COOP'S
SATELLITE
DIGEST**



JANUARY 01, 1985

INTERNATIONAL EDITION

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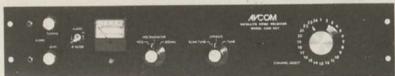
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TOP OF THE MONTH

CHANGE. It is all around us, all of the time. But seldom does it come so fast as to 'take our breath' away. This time it is different. Change, 'out with the old' and 'in with the new,' has been building all fall. And the nature and depth of that change will be the subject of a **special issue** of CSD/2 to be issued on January 15th.

AWARD. CSD began an 'Industry Man of the Year' award back in 1980. He was H. Taylor Howard. This year's award goes to the man 'who made us legal'; **Richard L. Brown.** It's that element of 'change' again; one dramatic act, not expected by many, which will have a profound impact on the way we do business in 1985.

LUXOR. We began a look at their Motala, Sweden facility in December and conclude it this month with some dialogue about how Luxor's marketing philosophy in Europe is being transmitted to their North American TVRO selling program. Once again, it is that element of 'change' at work in the industry.

RECEIVERS. Two 'also-ran' U.S. designed and produced TVRO receivers that have to date attracted only modest interest are studied in this issue; can 'small' American firms **continue** to compete with 'big' offshore producers? We'll see!

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OUR COVER/ Richard L. Brown headed up the team which pushed through the industry's "legislative victory" during 1984; the full legalization of home satellite TV viewing for non-scrambled signals. Brown is this year's "Man Of The Year"; see page 8 here.

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NASA KENNEDY SPACE CENTER

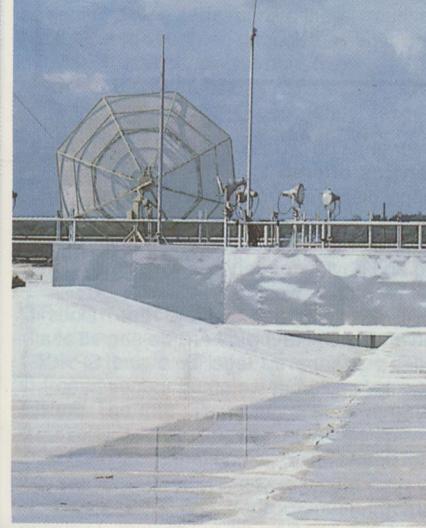
The Paraclipse 4.8 meter satellite antenna was installed atop NASA's Central Instrumentation Facility, at the Kennedy Space Center, November 1983. Paradigm engineer Gene Campbell (l.) and chief engineer Frank Casten (r.) assemble the superstructure using only simple hand tools and step ladders.



Mark Fator photographer

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The completed installation of the 4.8 meter antenna with the 3.8 meter Paraclide in the background.



NASA engineers watch as Gene and Frank fine tune the 4.8 meter with a spectrum analyzer.

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COOP'S SATELLITE COMMENT

- DEALER Board Matures
- 'BIG BOARD' Changes
- HBO + M/A-Com Shuffle

UNBUNDLING HBO

There is a battle underway pitting the 'best of SPACE' against 'the best of HBO.' We won't forecast a 'winner' here. But I think we can identify the possible losers.

The battle is raging between the SPACE 'position' that CBD services on Galaxy 1 should not be 'bundled together' and the HBO position that they should be bundled.

Bundling? What in the world does that mean?

HBO believes that unless they are able to 'market' a 'package' of software/programming services via Galaxy, there can be no effective marketing campaign and therefore no CBD service. They don't like the phrase 'bundling' but that is the one SPACE has adopted when describing the HBO plan.

SPACE, through legal counsel Brown, believes that bundling is someplace between unAmerican and illegal. Time will decide where it is within those limits, if indeed it is anywhere. SPACE says that if HBO bundles together ESPN (now on TR9 of G1), Disney, Cinemax, HBO, one or more Ted Turner services and perhaps others into a 'single package at a fixed price,' the TVRO consumer 'loses.' **Why?**

SPACE points out that if the TVRO consumer is given only one option ('the whole package, **or nothing**'), the TVRO consumer may be taking (and paying for) one or more services he or she would not buy 'in the open market.' Disney is a good example; ESPN is another. If you are forced to take Disney and ESPN to get HBO and Cinemax, but you never watch Donald Duck and never watch sports, you are paying for something you do not want and you are therefore being 'forced' to buy; against you 'will.'

SPACE thinks this is wrong, and wants to push HBO into a corner where HBO either offers G1 scrambled services individually, or, perhaps does not offer them at all. It is an emotional issue because everyone can identify with being forced to buy something they don't want, to get something they do want.

A magazine subscription is kind of like that. You order **TIME** to get the latest news and you never read the movie and TV reviews because you never watch television or go to the movies. If you wanted to know about movies, you'd buy a movie magazine; if you wanted to know about TV, you'd buy **TV Guide**. So you pay some amount of your money for pages which don't interest you.

HBO says that if they are forced, legally or in the marketplace, into not offering a 'package' of services, **there may be no services available at all**. They explain that if Disney has to market on its own, if ESPN has to market on its own, if Turner has to market on his own, the individual costs of conducting marketing (selling) operations will be so high that these lesser-grade services will simply not be able to offer their programming to home TVROs.

HBO suggests that even offering Cinemax and HBO, **without offering others in a package**, will be so expensive (since the TVRO universe is so small, still, and so spread out over a continent) that if there cannot be 'economies of scale' (ie. several premium and other scrambled programmers all being sold together), the CBD program will not work.

HBO believes it is right. SPACE believes it is right. Both are digging in their heels, preparing for what could be a long, drawn-out 'battle.'

The losers in this are going to be the viewers; those TVRO

consumers who lose no matter which way it goes. If SPACE wins, and every scrambled programmer ends up on his own, we'll certainly see many fewer scrambled services offered to home TVROs initially. ESPN, for example, will simply disappear from home TVRO screens; not available as part of a package, and not available separately because it is too expensive to market by itself. If HBO wins this one, some people will be buying and paying for services which they don't want or don't use. That will be money wasted.

Can we as an industry allow this type of battle to rage? Does it serve us best to have SPACE win? Or HBO win? Are we served at all by a long protracted 'battle' that saps up legal time and SPACE money since no matter how the outcome, we stand to lose?

We wonder, and ask you to think about it.

HBO Pleased

Initial results from the HBO analysis of the M/A-Com VC2C descramblers are in; they are good.

M/A-Com supplied 101 units to HBO initially. This was back in mid-November and for the next month those units were sitting out at the Long Island HBO test facility grinding away 24 hours per day. HBO had worked out a testing sequence which is of interest.

Using a proto-type 6 foot dish that originally came from **Alcoa**, HBO had an **MSE LNA** installed and a variety of (mostly M/A-Com) receivers. If you can picture HBO conducting 'tests' for their first **cable level** descramblers on a 6 foot **home dish** on Long Island, you have a good 'image' of the scene.

All 100 units ran for a full month. They were programmed as follows:

- 1) First all were turned off
- 2) Then they are turned on, one by one, at approximate 1 minute intervals
- 3) Then they were allowed to run and the uplink addressed (sent commands to) each of the units individually
- 4) Each unit had to respond to the addressing instructions and the unit's 'response' was logged electronically on a recording device
- 5) Then all 100 units were turned off and the sequence was repeated again . . . and again . . . and again (for about a month).

In the first 50 hours of test, not one unit failed to respond to one command. That's pretty decent. HBO was elated. M/A-Com was at least as pleased.

HBO fed a 9 to 9.5 dB CNR into each of the receivers for these tests. They wanted to test the ability of the units to perform at (typical home) signal levels while at the same time testing the reliability of the cable descrambler units. The tests were so good that M/A-Com cranked up their VC2C production line on December 7th and from that line came the units now heading to cable headends all over America.

HBO's full requirements will be supplied by the **California** facility of M/A-Com. The Puerto Rico plant, earlier included in the planning, will apparently be used for home style descramblers and the Showtime order. HBO has an interesting quality control program operating at the M/A-Com California plant:

- 1) Each unit is **production tested** in the plant as it is manufactured;

- 2) An HBO representative randomly selects one unit out of every 100 on the production line and takes it to a downlink site where he hooks it up to a TVRO receiver;
- 3) Then the unit's own address code is transmitted by the Long Island uplink and the unit is checked out, via remote control, from HBO in New York.

If the unit passes, all of the 100 units in that 'batch' are shipped. If the unit fails for any reason, HBO has the '**right**' to shut down the production line instantly and keep it shut down until the problem is resolved to their satisfaction.

As the first of the VC2C descramblers are arriving at cable headends, cable techs are getting instructions via TR22 on F3R. HBO is keeping a videotape running there, 'routinely' if not continuously, so that the cable users can unpack their units and be 'walked' through the installation and check-out phase.

One must wonder why HBO is going to all of this trouble on TR22 since they could surely keep better 'security' by transmitting those instructions in some other format. **Wonder no more.** By using an **open** satellite transponder, they also reach the **home** TVRO users and sellers with a very powerful 'psychological warfare' message; 'Scrambling is here and everyone is now on notice.'

1985; a new year with new problems and new challenges. And a new dedication to getting scrambling resolved, one way or the other, once and for all!

OTHER Publications Suggest

Among the 50 or so magazines I routinely read each month are **Cable Television Business** and **Video Store**. My magazines pile up in tremendous mountains and I employ a simplistic 'inta' and 'outa' system. The 'inta' pile usually precedes my reading by several weeks, or several months, and the 'outa' pile splits between those I discard totally and those that end up being stored for that eventual day when I will create a publications storage area someplace in the WIV complex.

Video Store is a trade monthly for people who operate video outlets. I, thankfully, am not one but I enjoy learning about their problems nonetheless since most of the video store problems relate to the tremendous explosion associated with home VCR ownership. An editorial in **Video Store** dealt with price cutting recently and I extract:

"Discounting is a wonderful marketing strategy, especially if you are targeting an unsophisticated, price-oriented shopper as your primary market. But if you think of yourself as a specialty retailer, and you are cutting your prices to compete with K-Mart, be advised you are making a horrendous error; one that will eventually drive you out of business."

I identified with that message because 1984 was a year in the home TVRO field where price seemed to be more important than product or service. Virtually every dealer I have talked with concerning price cutting has complained that he finds it difficult to compete with the pricing of Jimmy Long, or those people Jimmy sells to. **Video Store's** editor goes on:

"The theory behind discounting isn't terribly complex. There is one factor every discounter will live or die by: volume. Discounters must buy in volume to achieve the price breaks which allow them to work from low margins and rock bottom price points. Discounters must also sell in volume to keep inventories turning; it is how they eke out a profit."

Jimmy Long, for example, works in the 7 to 17% profit region. He buys discontinued goods or factory mistakes; overstocks which some hapless OEM got stuck with because the gear didn't sell as well as expected. Often it didn't sell as well as expected because it didn't work as well as expected. Would it surprise you to learn that Long moved more than 4,000 Janeil antennas in a single month? **Video Store** continues:

"Specialty stores, in contrast, operate on a different marketing theory. The idea is to offer knowledge and service. For this, customers expect to pay higher prices, which offsets the specialist's inability to buy in volume. The moment a retailer confuses the two positions — specialist or volume discounter — he is tampering with his cost of sales, his net operating profit and ultimately, his ability to continue in the marketplace."

Service and knowledge. Certainly the man who backs his beat-up pick-up truck to one of Jimmy Long's loading docks can anticipate very little of either commodity. He is buying cheap and he hopes that the

TVRO/ Five Years Ago (*)

Microwave General's **Chuck Colby** parked a 10 foot antenna lashed to a 120 degree Avantek LNA and an ICM TV-4200 receiver in downtown San Francisco at the "WESCON" show to display satellite reception to several thousand electronic engineers. CSD began describing mini-CATV systems to readers to help them better understand the interfacing required between terminals and signal distribution (i.e. SMATV). Only we didn't call it 'SMATV' then!

A firm in Florida calling itself '**Spacecoast**' announced a \$1200 'kit' of electronics which they claimed would allow you to build a complete LNA downconverter and receiver to go with your own reflector. In a CSD review, we labeled it a 'hoax.' **Robert Coleman** describes an 'active mixer' using GaAs-FET devices and provides a circuit board layout for the builders. A 'way around' the copyright question raised by receiving satellite TV signals and distributing them to friends and neighbors is discussed with the suggestion that all such systems simply 'pretend' they are 'small cable' systems. The FCC, meanwhile, is talking about re-doing Section 605 of the Communications Act since they are clearly concerned that TVRO use is a **possible** violation of that act. **ESPN**, meanwhile, is offering its services to home TVRO owners at \$100 for a 'lifetime' viewing license. Planning is underway for the second industry trade show, SPTS/Miami coming up in February; and **Arthur C. Clarke** writes to tell us that his 15 foot mesh dish, installed for the Indian 'Site' experiments, had been driven off his roof in a typhoon. CSD notes "It is our project for 1980 to try to locate some way for Clarke to have satellite TV reception in Sri Lanka . . .".

* From CSD for January 1980.

product he is buying is well enough engineered and well enough backed by the OEM that if there is a problem, the OEM will somehow stand behind the product and make whatever repairs as may be required. The buyer at Long's is gambling that for his discounted price, he will somehow get the 'bargain' he anticipates. He doesn't know, for example, that the receiver being so terribly price slashed by Long's is discontinued nor does he know that Long bought perhaps 11,000 of these receivers at an OEM 'going out of business sale.' **He also doesn't know** that the receiver's failure to perform as anticipated has subjected the OEM to tremendous cash-crunch pressures leading eventually to the supplier going 'upside down.'

The specialty shop dealer, the guy trying to make a living for himself and his family out of a fulltime TVRO retail shop, hopefully knows which products to handle and why certain products and product brands are to be avoided; at all costs. The guy buying from Long's usually sells out of his garage or his 'ham radio shack,' on the side. He carries no overhead, has no business tax to pay, and probably holds down a reasonable job 40 hours a week, outside of TVRO. He buys cheap stuff from Long's to package and resell on the side to other people who think **they also** are getting a 'discounted bargain.' The whole operation is a 'house of cards' starting with the OEM who is forced to empty his warehouse of slow moving or non-moving product at greatly reduced prices just to stay in business. Or, to satisfy creditors after he has gone out of business.

I hear dealers berating Jimmy Long because they perceive that he is 'ruining the business' with cheap prices, selling 'direct' to virtually anyone with the cash. **Jimmy Long is not the problem here**; every industry, every field has surplus merchandise that needs to be moved because somebody, someplace, has made a business error. If Amplica is able to bail out of a large quantity of slow moving receivers through Jimmy Long, and then bounce back renewed with the cash they received from Long with a new, viable receiver product, Long's willingness to take the slow moving stuff off of Amplica's hands and give them cash for it might have kept Amplica in the TVRO receiver business. If Jimmy Long didn't do this, somebody else would pop up doing the same thing.

I view Long's as a necessary part of our business just as **K-Mart** is a necessary part of retailing soft goods and appliances. There must be some '**relief valve**' in every business activity or the mistakes made by OEMs would eventually drive all but a handful out of

Look Beyond the Surface.



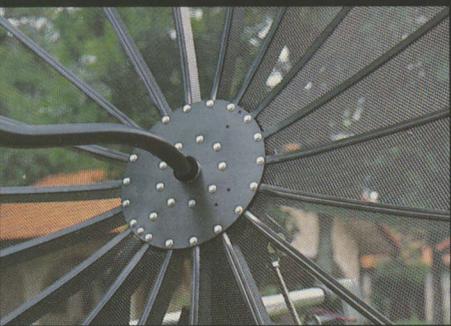
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RICHARD L. BROWN/ INDUSTRY MAN-OF-THE-YEAR

NOT Your Average Man

Richard L. Brown is an attorney and he has practiced one form of communications, law, or another, from his entry into the law profession. He started out by accepting employment with the Federal Communications Commission. This was at a time when the FCC was grappling with how they would create rules and regulations for the cable television industry. Cable growth, during the mid-60s, had posed a 'threat' to broadcasters. When cable first began, it 'stretched' off-air viewing into communities which were shielded from direct reception by terrain (hills and mountains) or distance. Cable extended TV viewing into these fringe areas and the broadcasters were pleased with the extra coverage which they received at no expense to themselves. But cable outgrew such communities during the 60s and began to tackle larger towns and cities where some form of off-air television reception already existed. Some of the first 'major' communities to get cable included Wilmington, North Carolina and Santa Barbara, California. Both Wilmington and Santa Barbara had local television stations but because of the television allocations scheme, neither had full (three) network service. Cable expanded the local viewing choices so that families there would at least have access to all three networks.

Broadcasters watched all of this with considerable interest and when cable began to make noises about wiring metropolitan regions (New York, San Francisco, Los Angeles, etc.) the broadcasters became alarmed. The broadcasters have always been fiercely competitive, within their local markets, but cable provided a new unifying force. Cable, unregulated, threatened their 'monopoly positions' in their markets. In particular, the network affiliates saw the 'importation' of distant same-network affiliated stations as a threat to their cash-flow. Since broadcasters are paid by the networks based upon their total coverage, the ABC affiliate in Wilmington, for example, did not want to lose any of its revenues to an ABC affiliate imported from Charlotte. And so the broadcasters, through their trade association and their Congressmen began to pound on desks at the FCC to get the federal people interested in this economic threat. The FCC, a more activist bunch then than now, responded by adopting 'interim rules and regulations' for cable TV (1966) and then putting cable growth on ice through 1972 / 73 while they 'studied' the matter.

Ultimately the start-from-scratch rules and regulations for cable system operation would be framed by a four man 'Task Force' headed up by one Sol Schildhouse. Richard L. Brown was a member of that 'task force' and it was up to Brown and his fellow FCC attorneys to create rules and regulations for cable. Ultimately, the rules would be described (and re-



described) as "the most onerous regulations ever created to regulate an industry." In a short phrase, the rules were just awful for the cable people but the broadcasters largely loved the rules.

The 'rule book' would be nearly 200 pages long of very tiny print. The rules would be so complex that virtually no cable company could 'comply' on its own; each would end up handing their problems to a Washington attorney so that he could sort the problems out a bit at a time. This, obviously, sounded like an excellent time to be in private law practice in Washington, D.C. Brown left the Commission and with Schildhouse they set up private practice; who better to help a 'client' (cable company) through the patchwork 'quilt' of rules than the 'team' that had written the rules!

At about that time a group of cable operators, mostly cable firms who operated in rural, 'traditional cable' markets, decided that **the rules** had been written in response to the 'big cable operator' threats to wire the big cities. The small cable firms, operating outside of the cities, saw no reason why **they** should be regulated with the same heavy-handed 200 page rule book as the big guys. And they protested.

They protested by forming their own trade association, 'splintering' away from the existing trade association. CATA, or the Community Antenna Television Association was formed and it, soon, was locking horns with the NCTA, or National Cable Television Association.

CATA's leader was a cable operator from the southwest; **Kyle Moore** was his name. Moore felt so strongly about the 'violation of his business rights' by the new rules that he openly challenged the FCC to 'shut him down.' He had defied the rules and constructed a small cable system in a crossroads



ONE OF THE 'GANG' Brown (right) with (new) SPACE President Bud Ross (Birdview), new Senate Leader Robert Dole, show Chairman Bob Behar and former SPACE President Peter Dalton (ex-KLM) at the 1984 Las Vegas show.

town in central Kansas (Gridley). He built the Gridley system by **not following** the rules and he **openly challenged** the FCC to 'shut it down.' The FCC first ignored Kyle's challenge but eventually so much press arose from his challenge that the FCC had to act. They sent a Federal Marshal to Gridley, Kansas to put a padlock on the Gridley cable system. All **105** homes connected to the system were going without television. That's where **Richard L. Brown** entered the picture.

Brown's first meeting with Moore was indecisive.

"You realize you have broken the law" suggested Brown. Moore argued that the 'law' was not a '**law**', but **a regulation** adopted by a federal agency. And he wanted to question where the federal agency got the authority to write such 'laws.' Moore was well versed on the 'Communications Act of 1934' and he found no suggestion there that the FCC had the authority to regulate '**reception**'; only 'transmitters' (i.e. transmission). Brown smiled at the defense and it would later become apparent that Brown himself had done considerable thinking, and research, concerning the '1934 Communications Act.'

Brown defended Moore, and ultimately would represent CATA (the trade association) in a number of forums. Before the Moore/Gridley case had wound its way through the FCC hearing process and was headed for the courts, CATA would take on the NCTA, the MPAA, the NAB and a host of other groups who wanted to help write 'cable rules' and 'cable law.'

Brown did such a good job of arguing the Moore/Gridley



BROWN as legal advisor (left) before meeting of SPACE board of directors; new SPACE Treasurer David Johnson (Paradigm) to right of Brown.

case the FCC did something quite novel; they decided to adopt an 'exemption system' whereby cable systems 'below a certain size' would not have to **comply** with the FCC rules. That number started out at 250 (cable subscribers), clearly larger than the Gridley system but not by much. Brown and Moore, however, represented nearly 400 cable systems through CATA and most of those had **more than** 250 cable subscribers. And so began a series of 'negotiations' all with the intent of disposing of the Kyle Moore 'problem' while at the same time not undermining (in the FCC's eyes) the character of the new rules. Ultimately, the exemption system would be phased in over a period of time with systems having fewer than 1000 subscribers initially exempted. In effect, Brown had been a key member of the 'task force' creating the rules, and now through client Moore, and CATA, he was assisting in their dismemberment a piece at a time.

Moore and Brown saw to it that CATA was very involved and very vocal in a wide range of cable affairs in the period 1975-1979. This was the period when the Motion Picture Association of America (MPAA) and others were hot on the trail of new 'copyright legislation.' The United States 'Copyright Law,' in effect at the time, was even older than the 1934 Communications Act. It had been written in 1909 and was clearly outdated. The MPAA wanted the new Copyright Act to force cable operators to pay a 'performance fee' for all of the TV stations carried by cable. That would benefit the MPAA

'MEN OF THE YEAR' / Past

CSD began the 'Man Of The Year' award for the industry in 1980; at the end of the 'first year' of industry growth. The award is given to the one individual who had made a major contribution (or contributions) to the basic fabric of the industry in the prior year.

1980/ 'Man of the Year' was **Henry Taylor Howard**, the industry's 'resident professor' who, during year one of TVRO, participated in numerous technology breakthroughs leading towards improved equipment designs and production capabilities. Howard also served the industry as the first President of SPACE and was a key part in preventing anti-TVRO legislation that had been introduced into Congress in 1980.

1981/ 'Man of the Year' was **Dave Federic** who had led a team in developing the industry's first true 'distributor' operation; National Microtech. Dave influenced hundreds to enter TVRO as dealers and established a pattern, with cohorts at National Microtech, for distribu-

tion of hardware in the industry. His firm's dollar support of OEMs such as KLM made it possible for mass production of TVRO receivers to begin in earnest.

1982/ 'Man of the Year' were actually 'Men of the Year'; ADM's **Jamie Gowen** and AVCOM's **Andy Hatfield** were recognized for their generous support to the industry's dealers in making available technical assistance and system planning expertise to a growing legion of 'start-up' dealerships coast to coast.

1983/ 'Man of the Year' was **David Johnson** of Paradigm Manufacturing. Johnson had risen from a small, regional supplier of TVRO antennas (Paraclipse) to a major national supplier, bringing mass-production techniques to antenna production for the first-time. He had also been elected as Chairman of the Board for SPACE, the national trade association, and President for Superfund, the financial group formed to beat down legislation designed to stop TVROs growth.

because those 'fees' to be paid by cable would ultimately end up in the bank accounts for the major motion picture firms. Once again, CATA objected and with Brown's advice CATA was able to create substantial 'exemptions' in the new Copyright Law for the 'smaller' and more rural cable systems.

All of this would ultimately play a big part in the development of our satellite delivery system. The Copyright Act, for example, would play a big part in the marketing of Ted Turner's super station (then WTCG) out of Atlanta. Special copyright fees were created for stations such as Turner's and it made financial life very difficult for cable systems that wanted to carry, from satellite, one (or in the 'best' case more than three) super station(s). (That is why, today, we have only three viable 'super stations' on satellite; WOR, WGN and WTBS. Cable firms cannot afford to pay the extremely high copyright fees that are charged by the new law for more than three 'super stations' delivered via satellite.)

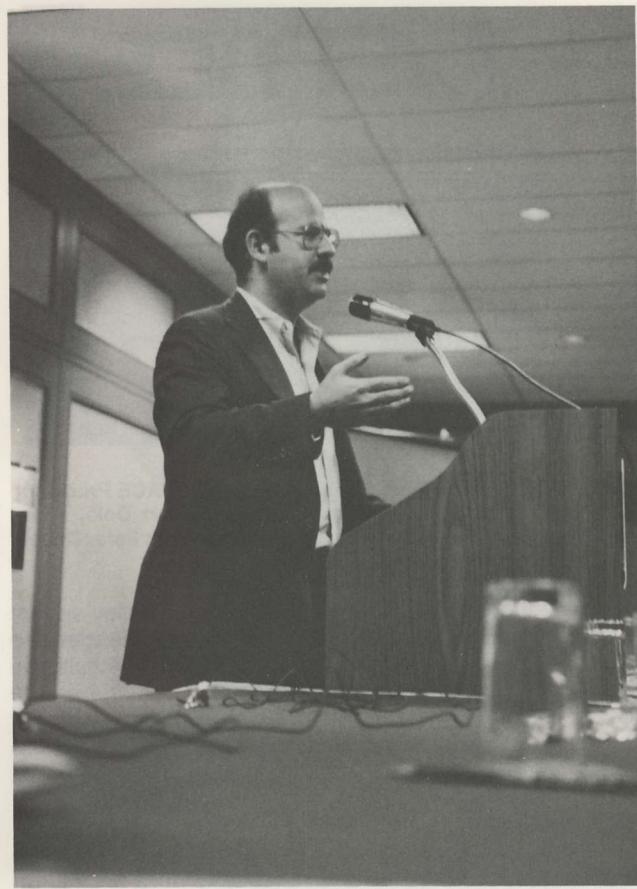
It was in 1975 that various engineers in the cable crowd decided to test the technical feasibility of receiving satellite signals using small dishes. The trade association, CATA, in particular focused on this and through its monthly organ (**CATJ**) devoted considerable space to the tests conducted with antennas smaller than 9 meters in size. Under then existing FCC rules, only antennas larger than 9 meters would be 'licensed' by the FCC. Once again, Brown was deeply involved in getting the FCC's rules changed and those rule changes allowed smaller antennas (down to 4.5 meters in size initially) to be put into service at cable firms.

And it was in 1978 that Brown, again acting on behalf of CATA, would file a proposal with the Commission to 'do away with' all FCC licensing of TVRO terminals. Others would jump on this bandwagon, as an idea whose time had come, and by the October 18 (1979) FCC action on this proposal, virtually everyone would be agreeing with Brown that further FCC licensing of TVROs was no longer needed.

Richard L. Brown was a part of 'this industry' before there was an industry. He was active at the FCC petitioning for rule changes which would ultimately create the ground-rules for TVRO as we know it today. His first, direct involvement with our 'legal problems' started just days prior to the first of the industry trade shows. It was August of 1979 and the first SPTS (Satellite Private Terminal Seminar) was only days away. Bob and Susan Cooper, the creators of the first show(s), were greeted by a Federal Marshal serving papers demanding Coop's presence in court that very day. A federal court at that.

The national trade association for the 'MDS' (point to point microwave) operators was seeking to have the first SPTS 'grounded' before it began. The concern of the MDS folks was that in that first SPTS, attendees were going to be 'taught' how they could 'break into secret microwave circuits.' There was a terrible 'paranoia' at the time that technical people were figuring out how to build 'MDS converters' to 'steal' MDS (single channel) microwave service. The MDS trade association asked the federal circuit court judge to stop the SPTS, or at least to issue an order that any technical sessions dealing with MDS be stopped before they happened. Brown, via long distance telephone, orchestrated the Cooper defense since there was insufficient time for him to travel to Oklahoma to handle the defense personally. Coop won, and the first SPTS went on essentially as planned.

That 'close brush' with the law, however, told the 500 attendees at the first industry show that many new legal battles were ahead for TVRO. Coop urged attendees to create a 'trade association for TVRO' and a committee was formed on



BROWN/ before SBOC' 80 in Houston brought report of victory in Congress against legislation prompted by HBO to outlaw home TVRO use.

the spot.

By the second industry trade show, held in Miami in February of 1980, the goal of creating a trade association was very clear. Brown appeared in a pair of seminar sessions and from that came SPACE; the Society for Private And Commercial Earth stations. Brown himself thought up the SPACE acronym and he agreed to serve as its first 'counsel.'

By the third industry trade show, held in San Jose in July of 1980, the legal front was 'humming.' New legislation had been proposed in Congress to **shut down** private ownership of TVRO; a North Carolina Congressman had introduced legislation that would make it a criminal offense (with large civil fines up to \$250,000) to be caught owning and using a TVRO. Brown and newly elected SPACE President **H. Taylor Howard** beat back the proposed law and TVRO bought itself another year to gain strength.

Brown preached that every new session of Congress was going to bring new legislative threats to the young industry, and that the only way to secure a good foundation for the industry was for TVRO interests to sponsor **their own legislation**. To do this, you had to find sponsors in Congress, preferably in both the House and the Senate. A handful of SPACE supporters, such as **Bud Ross** (Birdview Satellite) and **James Rothbarth** (STS of Missouri) saw the wisdom in this thinking; many more did not. Starting in 1981, and continuing for three years into early 1984, SPACE with Brown's direction and suggestion, backed by a small cadre of businesspeople kept after the concept. Legislators such as Congressmen **Rose**,



BROWN thanks TVRO dealers Charlie Brown (left) and King Oberlin for successfully completing a home terminal for Brown at his Bethesda, Maryland home (December 10).

Tauzin and Gore had to be 'courted' by SPACE. Senator Goldwater had to be courted in the Senate. They had to 'believe' in what our industry was doing, and to be willing to put their own prestige and influence on the line to 'fight' for the SPACE position. Introducing legislation which clearly benefitted home TVRO users took a certain amount of guts, and determination since many of the established communication interest groups (such as broadcasters) took a dim view of what we did and how we did it. In effect, by backing SPACE's position for private TVRO viewing rights, a legislator such as Senator Goldwater could expect to be 'cut off from' groups such as the broadcasters. All of this required political skill on the part of Brown, his staff, and the handful of intra-SPACE supporters who believed in this course of action.

It all came to fruition when during the March (1984) SPACE trade show in Las Vegas, a satellite link-up between the Vegas SPACE banquet and a Washington (DC) studio brought the news that not one but two separate pieces of legislation had been introduced into the law making process. Senator Goldwater would back and support **S.2437**, a bill designed to clarify the aging 'Communications Act of 1934' and which would make home use of a private TVRO totally legal. At the same time, Congressmen Tauzin, Rose and Gore would co-sponsor and back **HR.5176**, a bill designed to insure that if and when one or more premium (cable) programmers did scramble their services, those services would continue to be available to home (private) TVRO owners in a non-scrambled mode through rental or purchase of decoder devices.

The popular wisdom was that either bill would require at least two sessions of Congress to 'jell.' Both bills represented substantial changes in the communications law 'fabric' of the United States. Pressures to update the 1934 'Act' had been around for a number of years and there was little reason to hope that TVRO could get changes in 'the act' without a wholesale revisit to the act by dozens of other parties also advocating an update.

The bills attracted many additional supporters, in both the Senate and the House, as spring turned to summer. A skillful 'tree of support' advertisement run in consumer programming guides kept the message before all users; there was the **possibility** of worthwhile change if only enough users of the technology would get behind the movement.

In the end, as Congress was winding down its 1984 session and preparing to break for adjournment and the rush home for electioneering, there came one of those opportunities tailor-made for Brown's skills. A totally unrelated bill, dealing with cable television's legal relationship to cities, was nearing the end of its own multi-year journey through Congress. Backers of that bill wanted to see it adopted before Congress adjourned. They needed the support of a group and they made 'a deal'; support for the cable bill, **in return for** an agreement to 'look for' the opportunity to also pass at least the Goldwater-sponsored portion of the TVRO bills.

Between this mid-September agreement, made at the Congressman-to-Congressman level, and the final adjournment of Congress in mid-October, all of the pieces fell into place. In the end, skillful political maneuvering would cause the TVRO language to be attached to the cable bill and almost entirely because of private agreements between such Congressmen as Gore (Tennessee) and Wirth (Colorado, and a prime backer of the cable bill), TVRO would be granted an 'exclusive' modification of the 'Communications Act of 1934.' TVRO, private home viewing of non-scrambled signals, was legal. And the dozens of other industries clamoring for a re-visit of the same 'vintage 1934 act' would be left to await another session of Congress.

Brown's intimate knowledge of how Congress 'really works,' and his own passion to be a part of the legislative or lobbying process, made adoption of the TVRO 'legalization language' all possible. Perhaps it could have been done by others but it was done by Brown and his staff and that fact would stand for all time as an important benchmark in TVRO development.

Richard L. Brown receives and deserves this year's CSD 'Man Of The Year Award' because of his work in creating our new 'legal status.' He is all the more deserving because in the process of getting this legislation adopted, he has provided a framework for a much stronger and participatory industry in 1985 and after.

The 1985 'SPACE' is far more mature and far more supported by the broad base of the industry than any prior 'SPACE.' Brown's leadership role in SPACE has certainly been strengthened by adoption of the legalizing legislation. However, his own wisdom tells him that as the trade association has matured during 1984, his own visibility and his own hand in the day to day affairs must be reduced. And that too, is a measure of this most unusual man.

From a staff attorney attached to a task force at the FCC, designed to slow down cable TV growth, to his present position as the 'legal-leader' in the fastest growing consumer electronics industry in the world, **Richard L. Brown has come full circle.** His persuasion in 1971 was for 'controlled, viewer-restricted viewing' while his arguments in 1985 are for 'uncon-

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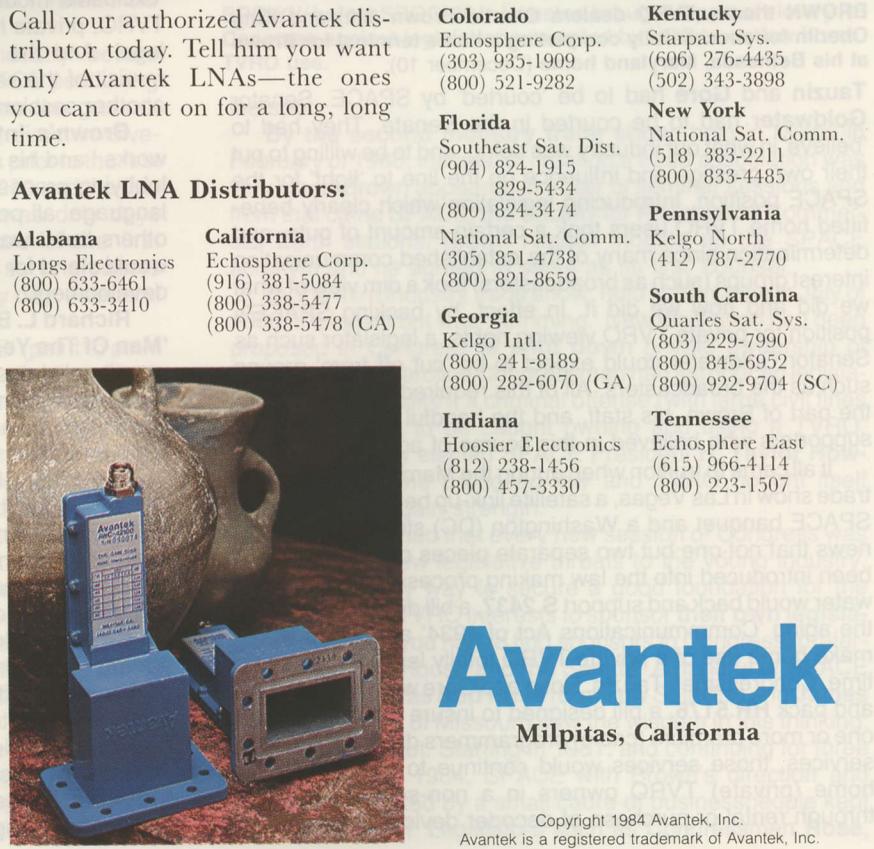
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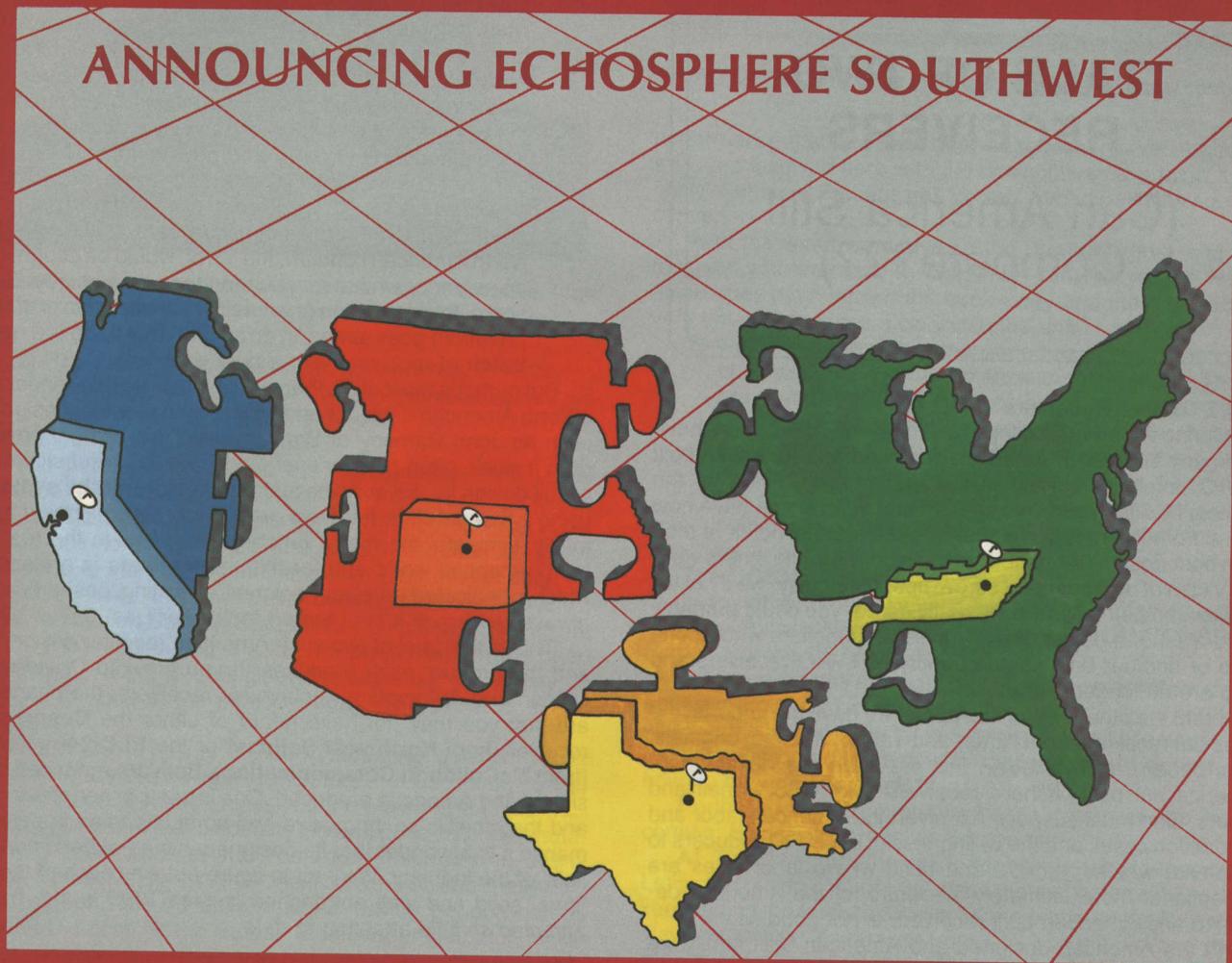
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trolled, viewer selected viewing.' As he said on a television interview recently, "TVRO is a three dimensional instrument of communications; before TVRO, we had sight and we had

sound. Now we also have choice, freedom of individual choice, of what you watch."

TALE OF TWO RECEIVERS

(Can America Still Compete???)

TALE Of Two Receivers

During the early development stages of TVRO, there have been any number of American designed and American built TVRO receivers offered in the marketplace. Many of the names, familiar three, two or even one year(s) ago have now faded from the receiver world. Some were the victim of their own poor design (remember the Telecom?) while others were the victim of management screw-ups (graciously, we'll not list any examples). If somebody really cared, you could probably build a list of a dozen or two American suppliers who at one time or another built some quantity of TVRO receivers and who are no longer with us.

From the other side of the 'pond,' we have the imports; the copy-cat receivers from Korea and Taiwan and the 'originals' from Japan. Inter-mixed in this we have the designed-in-America but built-offshore receivers from STS, Janeil and others. One must suspect that given the American labor and production costs, and the willingness of offshore producers to automate where practical and build where labor rates are exceptionally low, ultimately the future for the American designed and American built receivers is not good.

In the American designed and American built family we have a number of producers who insist that anything that can be done offshore can be done onshore better, and ultimately, for no more money. Here are some of the arguments from those who continue to wave the American (or Canadian) flag.

- 1) Labor rates are certainly cheaper in most off-shore production facilities, but labor rates in **some segments** of the US (and Canada) are also very low. If you seek out those areas (Arkansas, South Dakota for example), and if you work with local, regional, state or federal employment groups who want to subsidize American technology staying 'home,' you can often cut as good a deal as you can get overseas.
- 2) Production quality, offshore, is not high (except in Japan). This leads to major problems with entire batches of receivers brought onshore which do not function properly; requiring the US seller to go through a second level of test and repair **before** the units can be finally shipped and sold. This means the **REAL** cost of a receiver is the so-called 'landed cost' (from offshore) **PLUS** the costs of making the receivers 'right' onshore.
- 3) The turn-around time for improvements, circuit mod-

ifications, even correcting foul-ups, is or can be very high with an offshore producer. There is presently virtually 'zero-expertise' in the design area offshore and when something needs to be changed, the instructions have to be 'perfect' when 'transmitted' from North America to the offshore production center. If the person on the receiving end of the instructions is not fluent in the language of transmission, and nobody there really understands the circuitry and how it works, it is very easy for an instruction to change a ten ohm resistor to a 100 ohm resistor to become a 1,000 ohm resistor in production. If the same instruction were issued within a North American concern, the 'error' would be caught by an engineer who at least understood the circuitry. Offshore, the instruction (mangled in transmission or interpretation) goes ahead 'in error' and **now** there is a **new batch** of receivers with a **new problem**.

But perhaps most of all, there is the 'involvement aspect' of a North American designer and producer. A receiver designer such as John Ramsey of Sat-Tec 'lives' his design, seven days a week, often 16 hours per day. There is no substitute in circuit design for the ability to test the circuits **and the system** using a **live satellite feed**. No amount of test equipment can totally 'simulate' the many variables one finds in the real C band reception world and for this reason there is an 'edge' which a dedicated receiver designer, operating 'onshore,' will always have over a counterpart in the Far East.

This is the 'tale' of two such American receiver designers and the product each produces. If you are into Drake and Uniden and Automation Techniques receivers, the chances are that you may not have heard of either the **Cosmos II** receiver (from **Northwest Satlabs**) or the **ELC-24** receiver (from **McCullough Communication**). Both are American designed and American produced. One is basic in performance, and the other is so innovative and so outstanding in performance it is a wonder that its designers have not become the 'talk' of the industry. We'll try to figure out why each of these firms, solid and well entrenched in the TVRO world, have attracted so little attention to date.

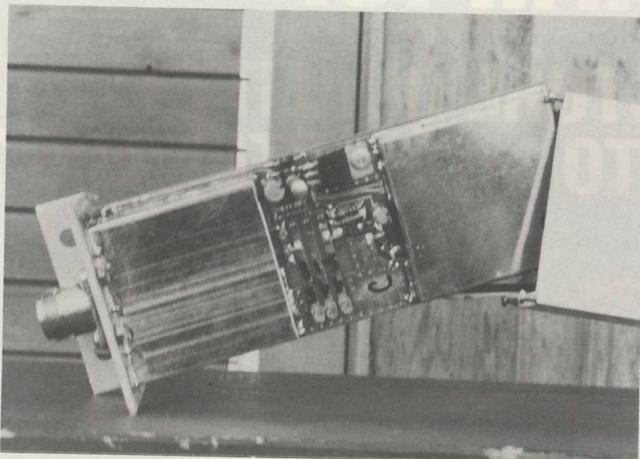
TEST: COSMOS TVRO RECEIVER

COSMOS II

The COSMOS II satellite receiver (Northwest SatLabs, 806 N.W. 4th Street, Corvallis, Oregon 97330; 503/754-1136) is the 'innovative' unit in our pair. The designers literally 'threw away the design book' and apparently started from scratch when they set out to create the COSMOS II.

There are two things about the COSMOS II which jump out at you as you begin to use and understand the receiver:

- 1) The receiver, connected to a Polarotor II™ polarization unit, does completely automatic selection of polarization. That may sound like a statement many others make. We'll see why it is not, and in the case of the COSMOS II, it is a totally unique and not duplicated feature in **any** other receiver.



COSMOS II downconverter may be the most innovative, high performance downconverter on the market today.

- 2) The receiver produces video quality which is second to none; nobody has better overall looking video and we do not make that statement lightly.

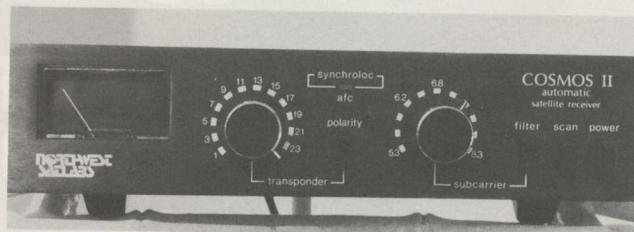
Now, what is a COSMOS II?

The people who created the 'Tweaker' satellite signal level metering system (for tweaking TVRO antennas; see CSD for May 1984) are behind the COSMOS II receiver. That would not normally be an adequate recommendation for someone to start out by throwing away the design book on TVRO receivers. It happens, however, that the crew at Northwest, led by **Jeff Smiley**, has been a part of the TVRO scene since 1981 and during the interim period they have been gathering in a group of engineering expertise which may be second to none in the industry today. **The proof is in the product.**

COSMOS II has an outdoor mounting downconverter which is totally sealed against moisture. It is also totally sealed against inspection and unless you are willing to void the warranty, you accept that it does its job and pass on understanding **why** it does it so well. It is a dual conversion unit (i.e. 4 GHz input, first conversion, high IF, next conversion and finally a 70 MHz output). The 70 MHz IF signal travels through normal RG-59/U cable to the indoor receiver/demodulator, while there are four wires required to carry voltages **and** polarization switching. The wires are on a terminal strip and while you could use additional lengths of RG-59/U for the voltages, it makes more sense to use a weather-protected four wire cable.

Unique feature: With COSMOS, you can run as much as 1,000 feet of 59/U and the four wire controls between the receiver and the antenna site. Very few other receiver systems allow you to run this much cable without degraded performance. The voltage and control wire sizes are modest; #22 gauge even for the 1,000 foot runs.

That they are able to separate the downconverter (and the Polarotor) control functions by as much as 1,000 feet and still 'play' is the first clue to their approach to the dual conversion downconverter. The specifications tell us there is '**45 dB (typical) of conversion gain.**' They also tell us that the downconverter has a nominal noise figure (i.e. conversion loss) of 12.5 dB with 10 dB being 'typical.' The 12.5 dB number would place the downconverter at the leading edge of the best in the industry; the 10 dB figure ('typical') will probably raise the eyebrows of other engineers who have attempted to do better than 12 dB; **and failed.** Numbers are easy to 'print' but the



FRONT OF RECEIVER has relatively simple operational controls.

performance that one sees does suggest some very unusual skills are involved here with the downconverter portion. Certainly Northwest SatLabs has 'copied' nobody with their down-converter!

With the wires run between the downconverter and the receiver, you are ready to inspect the receiver proper. Here, again, they have thrown the book away and there are some very unusual features included in the unit.

1) Polarity control. We mentioned earlier that when you change channels, the polarization also 'flops.' That's not so unusual since many of the detent tuning receivers have wired up their detents so that when the user switches from 1 to 2 on F3R, for example, the detent-change also switches the Polarotor from vertical to horizontal. That's no big deal since the same knob does both (or in the case of push button remote buttons, the same button does both).

The COSMOS II is different.

In any **other** receiver you have a 'format' button, to switch from the Galaxy/Westar format to the SATCOM/COMSTAR format. Not the COSMOS II.

This receiver has a circuit (their own) which **automatically seeks the proper polarization.** The receiver does not care whether the bird is a Westar or Satcom; in fact it can hardly tell the difference. And the tuning is continuous, **not detent.** So how do they do this magic?

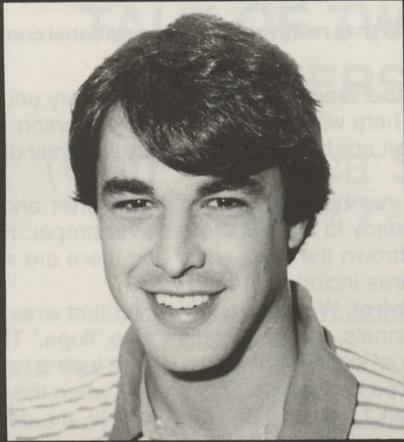
Northwest Satlabs probably has a patent or two here, coming. Basically, here is what happens:

A) The user grabs the tuning knob and changes channels. Let's start out on TR1 of F3R. If you tune at a normal rate and keep tuning the knob to 3 (from 1), the probe on the Polarotor stays on vertical. If you tune from 1 to 2 on the dial **and then stop tuning**, the receiver **waits** approximately **1 second** to insure you **really** want to stop on a channel with a different polarization, and then it activates the automatic polarization



"THE CONIFER SYSTEM IS TERRIFIC!"

IT HAS THE PICTURE QUALITY I WANT TO PASS ON TO MY CUSTOMERS."



Paul Giberti has been selling Conifer for over a year in the Whitman, Massachusetts, area and is convinced it's the best mesh system available today. Here, in his own words are the reasons why!

HOW DID YOU BECOME SOLD ON CONIFER?

"I had installed a couple of the Conifer dishes and liked them. Then, I went to a satellite show and saw the rest of their equipment and became completely hooked. The Conifer system is terrific!"

WHAT DO YOU CONSIDER THE MOST IMPORTANT FEATURE?

"From a dealer's standpoint performance is the most important quality of any satellite system. Conifer's performance is the best of any mesh satellite dish. I compare the Conifer system to competitive systems and customers want to know why Conifer's picture is so much better. As far as I'm concerned Conifer is commercial quality."

WHAT ABOUT THE APPEARANCE OF THE DISH AND RECEIVER?

"The dish looks nice. You can get it in different colors to blend into the environment. You can locate the receiver just about anywhere into any living environment. The system really fits in."

HOW ABOUT THE DURABILITY OF THE ANTENNA?

"The survivability of the Conifer dish is way up there on the list of outstanding features. We installed one dish forty feet up in the air that became completely caked with ice during a storm. Icicles were hanging 10-feet below it. Winds were blowing 60 to 70 miles per hour and the dish was completely operational the whole time. Another dish is located 35 feet from the Massachusetts shoreline and is constantly exposed to salt spray. It's been out there for a long time and so far I haven't had any problems. The antenna construction is outstanding and the mount is extremely well-built. It has to be to survive this environment."

DO YOU HAVE ANY COMMERCIAL APPLICATIONS FOR THE CONIFER DISH?

"Yes. I've put in a Conifer SMATV system and it's working perfectly. The dish performs well in SMATV applications and Conifer has all the equipment I need for a reasonable yet good quality SMATV system."

WHAT ABOUT CONIFER'S SERVICE?

"Service is probably one of the key advantages I find when I deal with Conifer. Whenever I have a problem or need help they're right on it! All the Conifer people are that way. And, their service and repair turnaround work is great."

HOW DO YOU SELL THE CONIFER SYSTEM?

"I show my customers a demonstration of the complete Conifer home satellite TV system and ask them to compare it to our competition. They don't always know what a good picture should look like. When they see the competition and then Conifer there's no doubt about it, Conifer always has the best picture."

WHY DO YOU RECOMMEND CONIFER?

"If any dealer out there needs someone to help them out, Conifer is the answer. I've had nothing but great experiences with Conifer. They'll be here long after many other TVRO suppliers are gone."

Contact Conifer today and ask for their new booklet: 77 Ways To Succeed in The Home Satellite TV Business.



"Microwave Specialty Corporation has range tested the (Conifer) AN1200 Micro-Grid twelve foot aluminum reflector with a Polarotor I™ Feed. Test patterns indicate...side lobes of less than 18 db and 1.4° beamwidth will provide normal satellite receive signals. This normal antenna performance would be inclusive of operations at the eventual planned 2° satellite spacings."

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search function. And in the case of changing from 1 to 2, it will switch the polarization from vertical to horizontal. There is more.

In addition to switching, it also 'fine tunes' the skew of the polarization device, **automatically**. The receiver 'senses' the quality of the picture, decides when it is best or not best, and keeps on adjusting ('rocking') the polarization motor **until everything is peaked up**.

This sequence takes around 5 to 7 seconds from the time the receiver knows you really do want to change polarization. It starts with the switching (2 seconds required) and ends with the rocking back and forth for best picture (3 to 5 seconds). This is admittedly slower than the 0.5 to 1.0 seconds required for the detent-tuned switching systems. But the trade offs come out in favor of the COSMOS II, because:

- 1) The user never has to worry about (**or even know about**) polarization switching. The switching is 'opaque' to the viewer, it just happens.
- 2) The user never understands 'format switching' between Westar and Satcom; again, it is 'opaque' to the user and it just happens.

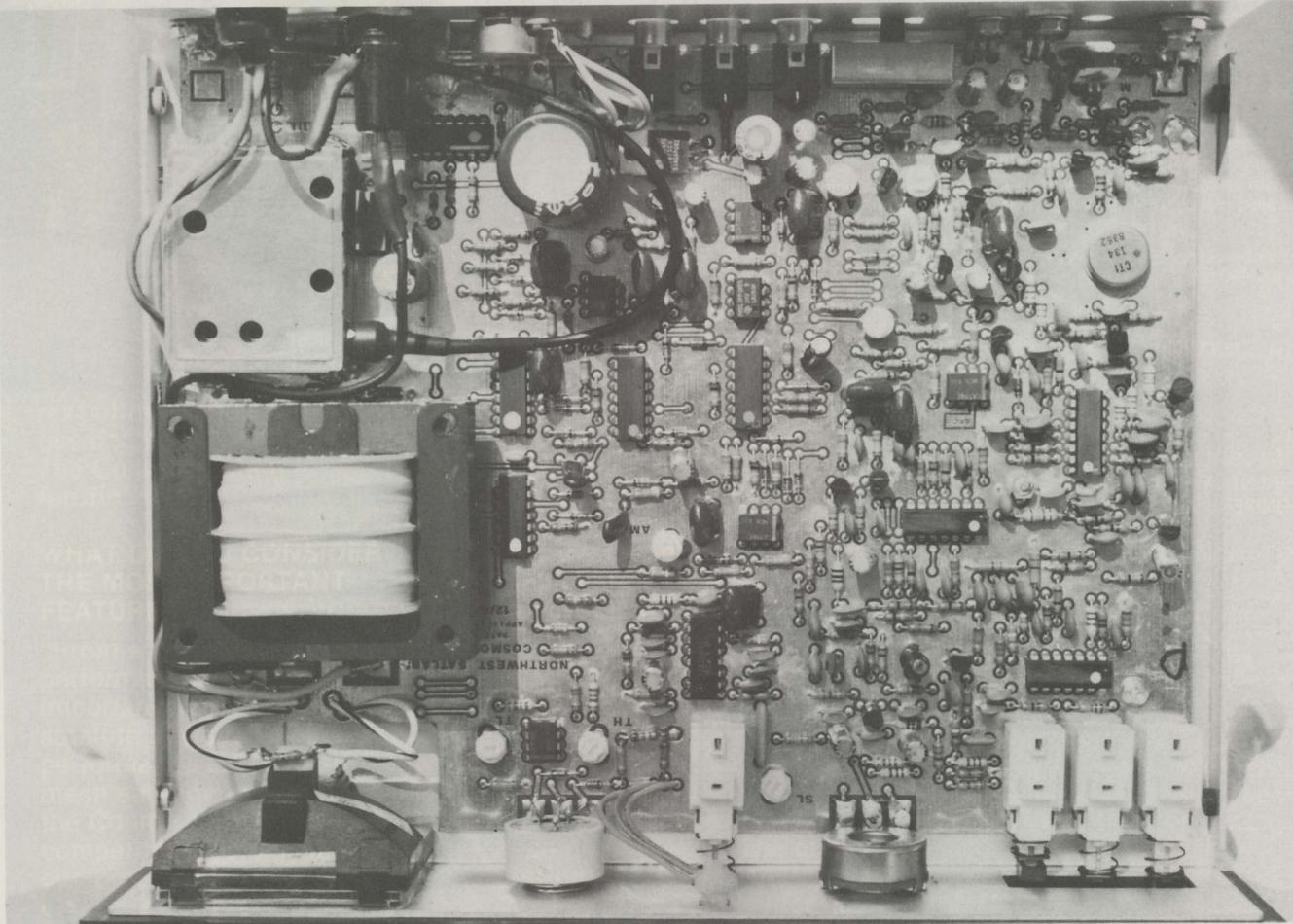
How Northwest SatLabs does this is their secret and even if we fully understood it, we wouldn't divulge it here.

There are some other 'unusual' (as in 'unique') features with the COSMOS II. For example:

- A) While your normal customer will want the polarization to be 'opaque' there are times when you must use a manual override mode. TI, for example, requires careful tuning to set the interfering TI source down on the skirt of the receiver. The receiver has a 'Manual' position which **shuts down the automatic polarization seeking** (the automatic circuit could lock

on the TI signal rather than the desired transponder). Now you can change channels and manually move the polarization probe with a front-panel button.

- B) Baseband-video-out is **prior to** both deemphasis or clamping. That makes the system, in theory at least, compatible with the threat of HBO scrambling and descrambler boxes.
- C) A channel calibrate knob allows the user or dealer to set up the receiver so there is proper tracking between the front-panel silk-screened channel numbers and the real channel numbers. Many receivers offer this but not very many can calibrate accurately so 3 is 3 and 19 is 19. **Both** of the COSMOS II units we tested **calibrated properly** and stayed calibrated after we messed with the controls.
- D) The downconverter (plus LNA feed through) voltage goes to the outside world (and the downconverter) through the two wires we mentioned previously. No matter how badly you screw up, such as reversing the wires, **you cannot blow anything up**. We tried and when you reverse wires all you do is not have performance; nothing 'breaks,' not even a fuse.
- E) The audio circuit provides '**mute between sub-carriers**,' as well as 'mute between transponders.' That's a nice touch and it means that when you tune off of 6.8 and wander down towards 6.2 you hear no hiss or rush of noise in between the two; the receiver simply goes 'quiet' until you come up on the next active audio sub-carrier. There is one more nice wrinkle in the audio; a wide (380 KHz) and narrow (150 KHz) switch allows the usual function for those audio subs that vary from one another. However, normally when you hit 'narrow' the volume coming out of the speaker drops lower in level (a function of deviation on the sub-carrier), and the listener must adjust the



COSMOS II receiver board is clean, well thought-out, and of high production quality.

master volume control on the TV set to compensate. **COSMOS II does this automatically**; tune in a narrow-deviation sub-carrier and hit the narrow button and the audio that comes out of the speaker now sounds just like the audio that was there with a wide audio sub-carrier tuned in. No change in volume.

Our second reaction, after we turned off the automatic features and operated the receiver in the 'Manual Mode' was that we surely could do a better job of tuning in the transponders and adjusting the polarization than all of those automatic circuits. There is a certain pride that goes with doing it yourself and operating all of the controls.

Well, we were wrong. There was nothing we could do in the manual mode which the automatic circuits did not do as well, or better, in the automatic mode. So much for our pride of operation. Then we invited some people who spend far less time than we operating satellite receivers to try it out; just run the controls. They instantly liked it far more than the usual collection of buttons and switches and that told us the consumer would find this unit 'more friendly' than some of the older style systems. Chalk up one for Jeff Smiley and his crew.

Which brought us down to the performance.

OUTstanding Performance

Our first 'trick' was to load down the system with an excessively long run of 59'; the manual said we could go 1,000 feet between the downconverter and the receiver, so we'd find out. Our test bench happens to have a selection of cable runs rolled up in increments of 50 feet from 50 through 250, and this allows us to switch between the downconverter and the receiver any length or combination of lengths we wish up to the sum of the five runs; 750 feet total. We did this starting at 50 feet, and on up in increments. The only thing we had to do was touch up the signal level meter calibration control (accessible through a small hole on the back panel) to keep our meter reading the appropriate amount. We found no problems here, to 750 feet total length.

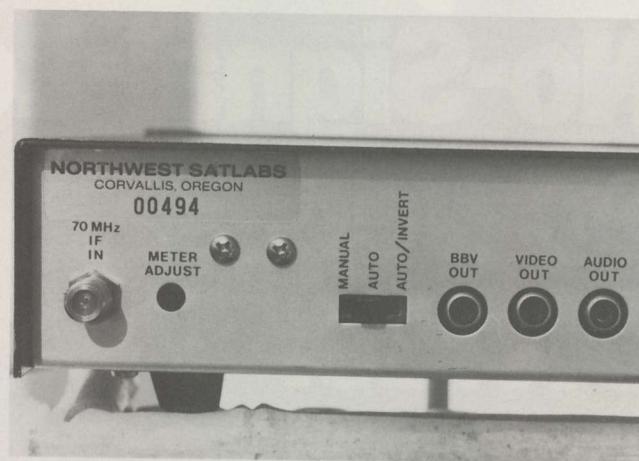
The next trick was to study the output video waveform. We do this in two ways; first we select an off-satellite transponder with color bars (such as TR1 on G1) and we observe the quality of the video on a standard baseband (video) monitor and then study it on a waveform monitor (scope). We compare the results with a reference receiver (DX-642) which we know and understand.

Then we connect up a **Newton Electronics** 2600 test set and create a 4 GHz 'test signal' modulated with color bars. Now we study the waveform found on the waveform monitor to determine whether the receiver under test is distorting the waveform; and if so (they all do, some), how much and where in the waveform.

Finally, there is the picture quality test.

This is more subjective than measurement driven, but there are certain things we are looking for. **An example**; the specifications with the COSMOS II says that it has a 25 MHz 'noise bandwidth' with a 1.2 to 1 'slope factor.' This is a fancy way of saying their bandwidth is **around 28 MHz** if you use the same criteria which many other manufacturers utilize to rate their own IF bandwidths.

One of the more popular ways of increasing the 'apparent' threshold sensitivity for a receiver is to **reduce the IF bandwidth** since there is an inverse relationship between IF bandwidth and receiver sensitivity. That is, as you narrow up the bandwidth, the sensitivity gets better. But there is a trade off here as any experienced dealer knows; as you **narrow up** the bandwidth, you **begin losing or discarding some significant portions** of the incoming signal energy. It happens that you can see this 'loss' in spectral energy by closely observing the saturated reds. A receiver that uses a very narrow (or too narrow) IF bandwidth will never produce a 'solid red' color unless the receiver is being fed a **very** strong satellite signal. The reds are lost or 'rolled off' by the receiver as the bandwidth narrows up. They appear as speckled-reds, laced with black and white dashes and dots. In severe cases, when there is a lot



REAR OF RECEIVER is plainly marked for each connection point.

of 'bleached' red on the screen, you can 'hear' this red speckled effect as a buzzing in the audio.

Our standard test procedure is to compare the reds coming off the same transponder at the same time on two or more receivers. The weaker the signal (from the satellite) the more pronounced the red speckles and the buzzing in the audio.

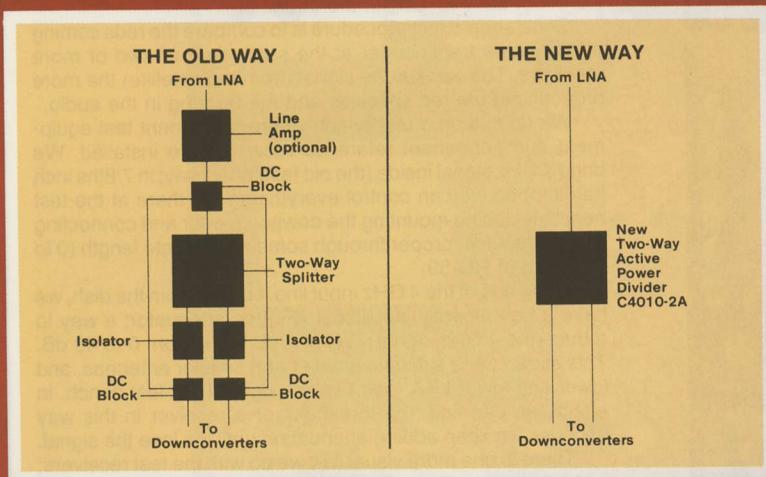
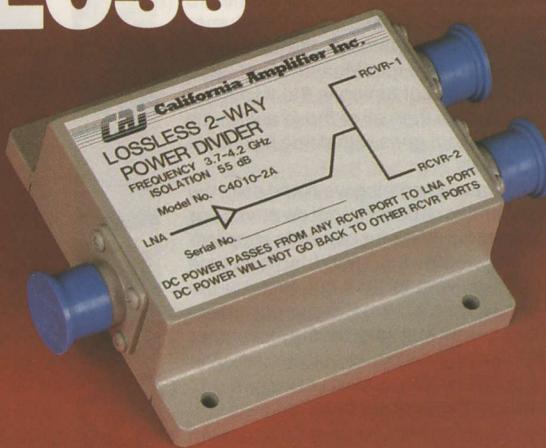
We do this on a test bench where permanent test equipment and permanent reference receivers are installed. We bring 4 GHz signal inside (the old fashioned way; in 7/8ths inch hardline) so we can control everything right there at the test bench; including mounting the downconverter and connecting it to the receiver proper through some appropriate length (0 to 750 feet) of RG-59.

At the end of the 4 GHz input line, coming from the dish, we have a permanently installed 1 dB step attenuator; a way to reduce the 4 GHz signal level in 1 dB steps from 0 to 40 dB. This allows us to simulate smaller and smaller antennas, and lower and lower LNA (gain) values right at the test bench. In effect, we can find 'the threshold' of a receiver in this way because we keep adding attenuation until we lose the signal.

There is one more visual test we do with the test receivers; vertical edge tearing or streaking.

Many receivers have a tendency, give or take a couple of dB signal level **either side of** their 'threshold point,' to cause the vertical edges on a man's suit (for example) to streak to the right on the screen; a dark suit **will streak into** a white shirt with 'tailing.' This is caused in the receiver's demodulator and video stages when the abrupt transition from a dark (saturated) color to a light (unsaturated) color occurs. If you are careful, you can

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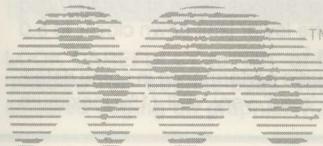
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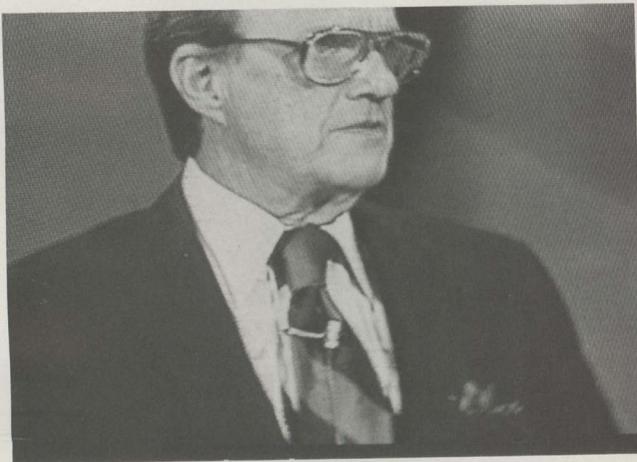
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NOTICE EDGE BLEEDING/ transition from dark coat to light shirt is 'fuzzy' and 'ragged' on this comparison receiver.

spot this in a 'split screen' (3/4) color bar pattern as well. **Look at the lower left corner** of the screen where the white stub-bar (short) transitions to its own right to a dark blue color. Here you can see the streaking as an instability in the border line between the white-stub-bar and the darker colored bar to the right. If that white to dark transition is straight and true, not wandering around with 'glitches,' you have good video demodulation. **If the line bends and twists** and is not perfectly straight up and down, there is a non-linearity someplace in the demodulator/video section.

By adjusting the input signal level (with the step attenuator), and observing the amount of red speckling plus the amount of dark to light (and light to dark) instability or streaking, you have a fair approximation of the ultimate video performance (and threshold performance) of a receiver. Some of the photos here show how the COSMOS II compared with our DX-642 reference receiver (costing more than twice as much) as well as with an AVCOM 2B receiver which we favor for low threshold performance.

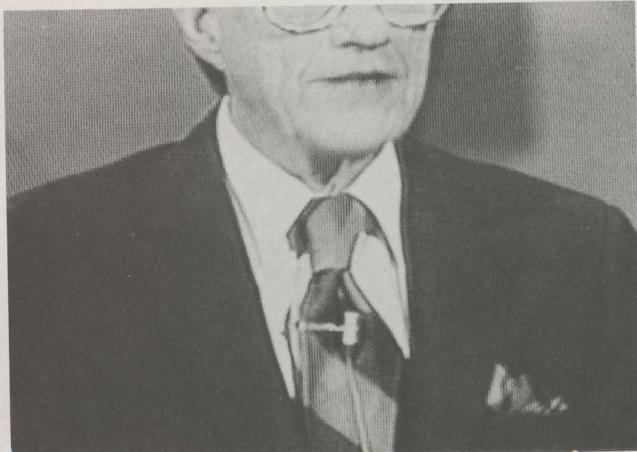
By actual measurement, the COSMOS II **outperforms** the AVCOM 2B for threshold sensitivity (defined here as the point where both lose color) **by 1 dB**. By observation, the COSMOS II retains red-color purity (ie. does not lose the solid reds) by 2 dB over the AVCOM and by 3 dB over the DX-642. In that same 2 dB 'window' the 2B had noticeable tearing on the dark to light transitions. We could **not create** streaking on the COSMOS at **any signal level**, right down to no signal level. The picture simply gets noisy with the traditional sparklies but remains absent the streaking all the way to zero.

Northwest SatLabs has obviously done 'something' in their video demodulator and video stages which others have not yet 'discovered.'

Finally, **there is the matter of picture quality.** This is the most difficult factor of all to measure and it is admittedly subjective. What you are looking for here is the **variations** in solid colors. Let's say a man is wearing a dark blue sweater. The sweater wrinkles across his chest and stomach because few sweaters are designed to be 'skin tight.' **Within** those wrinkles, there are tonal variations in the amount of light caught and reflected by the sweater. If you study this closely you can see that a high quality picture allows you to see (perhaps subliminally) that the sweater is 'three dimensional'; that is, there are 'peaks and valleys' in the ruffled front on the sweater. The picture is therefore 'more pleasing' because it looks 'more natural.'

In a lesser-quality picture the sweater's ruffled front blends into a more solid color and the 'depth' of the sweater, that three-dimensional effect, **is lost.**

This is difficult to photograph but in two identical side by side monitor pictures you instantly 'know' and appreciate that one picture is indeed 'more lifelike' than the other.



NOTICE CLEAN EDGE/ now transition from coat to shirt is well defined on his COSMOS II picture from the same network feed; superior COSMOS video.

We do this test, as subjective as it is, routinely using the DX-642 or a Microdyne 1100-TV receiver as a standard reference. Both have excellent video definition and any receiver not of their quality looks somewhat 'pale' by comparison. Some people call this element 'picture snap;' that is, the picture seems to 'snap' or 'jump' out at you because it has that 'third dimensional' look.

The COSMOS II receiver is a marginal loser to the DX-642 in this test; the equivalent (in this test) to the AVCOM 2B unit. However, a similar subjective test can be performed using the red and blue graphics display on TR12 of G1. The bright red field in this display, coupled with the white over red lettering and the moving blue ribbon display makes an excellent subject for evaluating 'edge definition' against varying amounts of input carrier to noise ratio.

White lettering, set against a dark (such as red or deep blue) background wants to 'ring' or 'edge-tear.' Sometimes it comes through the bird this way because graphics are the most difficult-to-control video images going today. They are the ultimate or supreme test in any (home) TVRO receiver.

Again, our standard of comparison is the DX-642; a high quality unit which has provided exceptional value for SMATV system operators for several years now. The photos here tell the tale; if you look closely at the right hand or following edges on the letters (G in particular) you can see that there is a darkened area ('bounce-back') just to the right of (or following) the letters with the DX display. When you have a display such as this, there is a minute (but perceptible to the eye) **lack of 'edge definition'** with a picture. It really stands out on a graphics display but is there even with normal moving video as well. You'd want to select a receiver with an absolute minimum of 'bounce back' (or conversely the greatest amount of edge definition) if you were going to connect the TVRO receiver to a projection TV receiver system. Why? Simply because when a picture gets 'blown up' the image edges get bigger and bigger. Now what was a small 'bounce back' and a loss of a small amount of edge clarity becomes a much larger (smeared) edge, and that contributes to a projection picture lacking decent definition.

AUDIO Performance

The audio specifications on the COSMOS II call for complete tuning between 5.3 and 8.3 MHz. In the 'olden days' of a few years back, virtually everything fell between 5.5 and 7.0 but of course as transponders for WTBS and WGN (to mention only two) have loaded up, they have pushed the limits of bandwidth lower and higher. It is unlikely that anytime soon you will be out of the **audio** tuning range with a 3 MHz span but we do know of serious plans at United Video (common carrier for WGN) to push the lower limit down closer to 5.0 MHz with some new **'data channels.'**

Northwest SatLabs specs their audio performance in some detail; more so than most. The numbers 'read' very well (1% maximum

COOP'S SATELLITE DIGEST

PAGE 23/CSD/1-85



NOTICE white streaking in 'red' area just above 'B,' 'S,' 'F,' 'C' and 'E' on game board; saturated red on this signal is more than receiver can handle.

harmonic distortion; 48 dB carrier plus noise to noise with a 1 KHz tone modulating the audio sub-carrier, and, an 8 dB Carrier to Noise ratio) but the proof is in the performance.

We already noted that this audio section has two positions; a 380 KHz 'wide' position and a 150 KHz 'narrow' position. These numbers are a tad misleading since they spec their bandwidth at the '6 dB down' point and most receiver people prefer to talk about the bandwidth at the 3 dB 'bandwidth point.' This simply says that COSMOS is narrower than both (380 and 150) if you are comparing 'their numbers' to other's (3 dB bandwidth) numbers. How much narrower should not be significant, but it is 'their secret' for now.

This is a mono-only receiver; you can tune in the separate (discrete or matrixed) sub-carriers alright but only one at a time. If you opt for living-stereo from a COSMOS installation, you will be using a stand-alone audio processor unit.

Our standard test for audio sensitivity and selectivity is to switch into a receiver's narrow position and go looking for the sub-carriers on WTBS. If you can count seven (as of early December) plus the main program audio channel, you have them all. Down in the Caribbean where WTBS is weaker than most, you don't usually find all seven that you can listen to comfortably unless you are on a 20 foot antenna.

There are two tough channels on WTBS; the 'comedy channel' near the top of the sub-carrier dial is reported to be deviated only 35 KHz and thus even in a 'narrow' 150 KHz position you are only filling



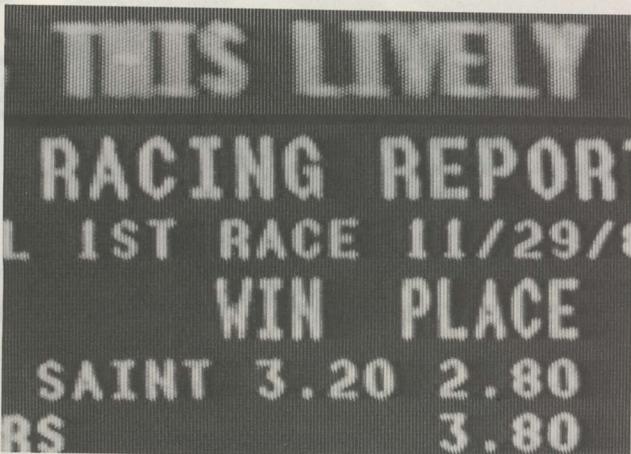
NO WHITE streaking here; same area is now 'solid red' with no disruption of red field on COSMOS II video from same network feed.

slightly more than 23% of the available (audio IF) processing bandwidth with modulation. You get what you would expect to get; 23% music and 77% 'noise' (from the audio IF bandwidth that is not filled with music or audio). That's a tough test, even within CONUS.

The other tough one is the 50's rock and roll channel found just below the WTBS audio sub-carrier at 6.8 MHz. This one is also under deviated, and run in monaural since virtually none of the 50's music selected recorded in stereo to begin with.

Our 'reference unit' for audio tests is the USS/Maspro SSP-1 outboard stereo processor. We use this unit as a reference piece because it has a **continuously variable IF bandwidth control** on the front panel and you can adjust the audio IF processing bandwidth from around 50 to 400 KHz. This means you can make its bandwidth just about the same as any TVRO receiver audio IF bandwidth and do a simple 'A/B' comparison, or, connect it all to a scope and actually measure the signal to noise ratio.

In our 'A/B' tests (i.e. you listen to the audio) using the narrowly deviated comedy channel on WTBS, we found there to be a discernable difference in background noise **in favor of the SSP-1**. By varying the SSP-1 bandwidth control, we made both sound as close to identical as possible and then computed the bandwidth difference. It worked out to about 2 to 1 telling us that the improvement we were hearing in favor of the SSP-1 was around 3 dB. That may suggest to you that the audio section of the COSMOS II is not as good as it could or should be.



LOOK CAREFULLY to 'left' of large letters (i.e. 'W' in WIN) for 'shadow' or 'bounce-back' ringing in video. This results in smeared edging on graphics (COSMOS II receiver).



SAME VIDEO/ no sign of video ringing on graphics. On a projection screen, this one would be 'sharper' to the eye. Video is from DX-642 commercial receiver.

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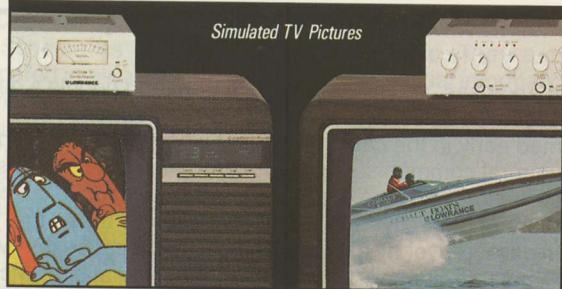
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Actually, it is far better than most tested to date and it is the **first unit** which allows us to totally clean up **all** of the background noise on the 50's rock and roll channel just below WTBS audio. Previously, it took an outboard processor to accomplish this task with the added expense and myriad of controls found on outboard audio processors to make it all work.

Northwest SatLabs makes the claim that their audio frequency response is flat (to within $\pm 1\text{dB}$) from 50 Hz to 15 KHz. That is not quite as good as you would expect from a quality FM tuner/(amplifier) but if this is a verifiable number, it is excellent for a TVRO receiver. Using a scope as an audio spectrum analyzer, we can tell you that there is around 3 to 5 dB more high end frequency response (above 10 KHz) than we find with the run of the mill audio sections in most TVRO receivers.

You can hear this 'difference' even on a small receiver with a 2 to 4 inch speaker crammed into the side of the cabinet. In particular, the highs are 'there' and the audio has a crisp sound to it. Once again, it appears Jeff Smiley and crew have done their homework properly.

SYNOPSIS

The COSMOS II is the 'sleeper receiver product' of the year. First shown in Las Vegas, it attracted only modest interest from dealers who probably did not understand what it was they were seeing. Smiley's group was disappointed because they knew they had a winner. They bounced back at the Nashville show by doing direct on-screen comparisons in the booth between their receiver and a host of 'popular' receivers (Drake, Avcom, et al). They 'dared' do a full display where the dealer could look at up to five separate receiver displays simultaneously because they were that confident of their product.

Still, it has not taken off.

Perhaps dealers, like this reviewer, have become so accustomed to the manual selection of polarization and format and skew that their instant reaction, like our own, was "I'd rather do it myself." However, in talking to some of the dealers who are handling the COSMOS receiver (such as **Wayne Morong** of Maine) we learned there is a different side to the product and set out to do our own evaluation.

We find the COSMOS II to be an outstanding performer with unusual features one would expect to find only in a very high priced and very sophisticated package coming from a much bigger company. If nothing else, the COSMOS II unit partially restores our faith in the ability of creative American designers to 'hang-in-there' with their off-shore competition for many years to come. Smiley is already 'smiling' about the next generation of his innovative receiver line and if the receivers take off as we suspect they now will, his **next big problem** will be to maintain the quality they now apparently have as the volume of their product doubles and doubles again.

If you are a serious dealer, you owe it to yourself to order one of the COSMOS II units for your own evaluation. We tested two to make sure

TRADITIONAL By McCullough

As unusual in design as the COSMOS II is, the ELC-24 Satellite Television Receiver by **McCullough Communications** (Route 5, Box 97, Salem, Arkansas 72576; 501/895-3167) is 'basic' or traditional. And for good reason.

Hayden McCullough got started in TVRO in the summer of 1979, one of a substantial handful of Arkansas people attending the first SPTS event in Oklahoma City. McCullough would strike up a friendship with spherical antenna pioneer **Oliver Swan** and from that friendship, subsequent to Oliver's death late in 1979, McCullough would become the major source for 'spherical TVRO antennas' for the next several years. The McCullough **'8-Ball'** antenna sold in the thousands and its basic redwood and steel-materials format was well suited to the then-developing cadre of TVRO enthusiasts who would in later years form the nucleus for the present dealer network.

McCullough came into TVRO from the cable television industry. He operated a string of very small CATV systems in

COSMOS II SPECS

INPUT RANGE	3.7 to 4.2 GHz
INPUT LEVELS	-35 to -55 dBm
INPUT MATCH (loss)	Greater than 10 dB
IMAGE REJECTION	38 dB or more
CONVERSION GAIN	45 dB typical (4 GHz to 70 MHz)
NOISE BANDWIDTH	25 MHz with 1.2 to 1 slope factor
THRESHOLD	*
VIDEO OUTPUT	1 V p-p, 75 ohms output, into 500 ohm load
BASEBAND OUTPUT	.5 V p-p, unfiltered, unclamped, not de-emphasized
DISPERSAL CLAMP	Greater than 40 dB
VIDEO S/N	**
DIFFERENTIAL PHASE	$\pm 2.5^\circ$
DIFFERENTIAL GAIN	$\pm 3\%$
FREQUENCY RESPONSE	.5 dB to -2 dB max, 50 Hz to 4.2 MHz
SUBCARRIERS	Tuneable 5.3 to 8.3 MHz
HARMONIC DISTORTION	1% maximum
AUDIO OUTPUT	.5 V RMS, 75 KHz peak deviation

AUDIO BANDWIDTH	380 KHz, 150 KHz, 6 dB points; switchable
AUDIO S/N	***
FREQUENCY RESPONSE	50 Hz to 15 KHz, $\pm 1\text{dB}$
POWERING	105-120 VAC primary; 11.5 watts
CONNECTORS	4 GHz (N); 70 MHz (F/F); Powering (terminals); RF out (through internal modulator) (F); Audio and Video and baseband (RCA).
RF OUTPUT	Channel 3 or 4 (switchable), +6 dBmV measured
PRICE	\$430

*/ COSMOS manual makes 'lightly' of threshold; CSD measures it at 8 dB for static video.

**/ CSD measured 45 dB SNR with 23 dB CNR.

***/ Not measured, rated excellent by CSD comparative testing.

SOURCE **NORTHWEST SATLABS**, 806 N.W. 4th, Corvallis, Oregon 97330 (503/754-1136)

CSD RATINGS

- | | |
|------------------------|------------------------------------|
| 1) Video Sensitivity | In top 5% of all receivers tested |
| 2) Video Color Quality | In top 10% of all receivers tested |
| 3) Video Stability | In top 5% of all receivers tested |
| 4) Audio Sensitivity | In top 5% of all receivers tested |
| 5) Audio Quality | In top 5% of all receivers tested |

we were not being biased with a 'ringer' and as you can tell, we think this is the most exciting (almost) new receiver product to hit the marketplace in the past 18 months or so.

rural Arkansas, and he knew and understood people's desire for improved television reception in rural America. He had learned early in the cable game that when you were trying to serve rural communities with multiple channels of television, you were forced by the economics of the situation to cut costs at every opportunity. 'His cable towns' were those that had been passed-over by early cable pioneers because they were 'too small' to support traditional cable installations. McCullough identified with the philosophy of Oliver Swan; 'do-it-yourself,' 'don't waste any money,' and 'keep the charges in-line' with what the people are able to afford.

TEST: McCULLOUGH TVRO RECEIVER

He brought the same philosophy to his '8-Ball' antenna line. But the industry's interest in spherical antennas was a fleeting thing, driven at the time by its price and by the fact that motor drives had not yet 'arrived.' When Hayden first introduced the 8-Ball, most of the TVRO enthusiasts entering the field were people from other electronic persuasions; TV repair shop operators, amateur radio operators and others who were not afraid to skin a few knuckles putting together a system. Hayden priced the 8-Ball so that these 'cost-effective' people would find it attractive. And he emphasized that with one spherical reflector, the user could receive two or more satellites with a **fixed** reflector surface, **moving the feed location** in front of the semi-parabolic dish to 'change satellites.' By 1982, motor drives had 'arrived' and the large and often cumbersome technique of physically moving the feed from one spot to another to 'change satellites' was no longer an attractive solution to receiving multiple satellites.

Hayden wisely saw the demise of the spherical dish, and having built a small, but successful company around it as a product line, sought another product which the company could shift into. By now he was so totally immersed into TVRO that he had sold his cable television systems and he had the capital available to enter a more advanced form of TVRO technology. **Receivers would be his choice.**

With an electronics background, receivers came naturally to Hayden. He had been building his own TVRO receiver circuits since 1980 and while they had not been intended as commercial products (his cable systems, you see, needed TVRO receivers and he felt he could build them cheaper than he could buy them; more of the Oliver Swan philosophy!), it didn't take much for him to shift from proto-type to production. Early McCullough receivers were 'par'; they operated about as well as others but there was no special dealer incentive to purchase them. McCullough opted to be a 'regional' supplier of receivers, keeping dealers in a several state area surrounding Arkansas supplied with their needs. That has always been a strength of Hayden McCullough; he comes from a technical background, has installed hundreds of TVROs himself, and he has usually been willing, and able, to make himself available to dealers (in person or on the telephone) to help them with their installation problems. In fact, many dealers bought from Hayden because of this close liaison he was willing to give to their efforts, and because he was a personable type of person they identified with.

ELC-24 Design

Schematics of the ELC-24 are available. They are not prepared in elegant form but all of the essential information is there. Not all receiver suppliers are 'so free' with revealing 'their' technology.

The downconverter, a 4 GHz input and 70 MHz output (single conversion, image-reject) system uses the popular Avantek 1506 oscillator. The 70 MHz signal coming out of the four-diode mixer is amplified in an NEC 5801 bulk-gain amplifier before the downconverter turns loose of the signal for transportation inside in standard RG-59/U cable. Powering for the downconverter is through the coaxial cable but the tuning voltage for the downconverter is fed in a separate wire. Runs to 300 feet are recommended with RG-59/U cable and for runs over that length, RG-6/U cable is recommended. DC voltage to the downconverter (and for feedthrough to the LNA) is +24.

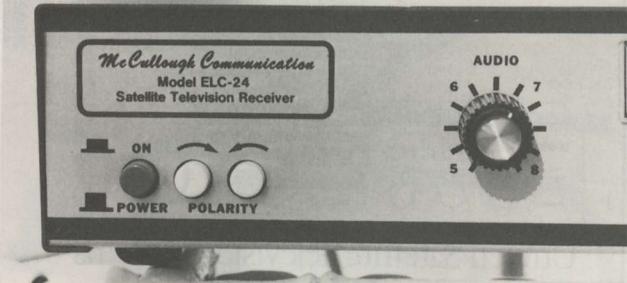
In the receiver/(demodulator) proper the IF signal is amplified in a 2N918 (IF gain 'control' is handled ahead of the 2N918) and then it enters the IF string at 70 MHz through a pair of (additional) MC5801 bulk gain devices. The 70 MHz band-



FRONT of receiver is straightforward, not fancy.

pass filtering is 'traditional' with an IF bandwidth of 30 MHz according to the printed literature. Technician-accessible test points are provided going into, and coming out of the 70 MHz 'gain and filtering block' and the signal level metering is fed from just ahead of the last 5801 gain block.

Hayden's approach to the demodulator is to use a coaxial cable delay line, not dissimilar to many others (such as Drake). Hayden calls it a 'phase discriminator' and the delay line is 82" of RG174. Coming out of the detector/discriminator there is a 2N2222 video amplifier, a video filter for the appropriate de-emphasis, second and third 2N2222 video gain stages followed by the video clamp (diode), and, finally a



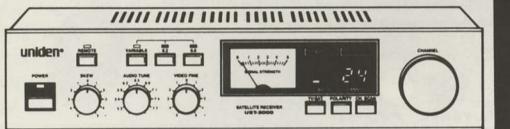
fourth 2N2222 video gain stage. Video level is controlled by varying the voltage to the second 2N2222 stage.

If you are with us this far, you will recognize this approach as 'basic.' One of the primary advantages to taking this 'basic approach' is that you are dealing with a receiver circuit which



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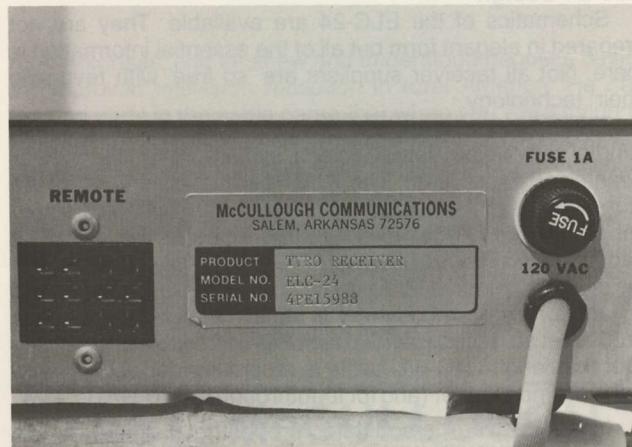
has been proven in tens of thousands of receivers (if, indeed not several hundred thousand receivers) previously.

The **audio sub-system** consists of a tuned input followed by an MC3357 and a CA3089. The audio sub-carrier tuning is picked off of the first 2N2222 video (gain) stage. Again, nothing unusual here; it has all been tried and proven in numerous receivers produced by others in its basic format.

McCullough, like John Ramsey of Sat-Tec, likes to remove unnecessary parts from a system. He does this for the same reasons John does; fewer parts means less cost per (receiver) unit, and, the fewer parts inside of the case, the less there is to go wrong.

McCullough, bowing to some dealer pressure perhaps, does provide a remote control (wire connected) for the ELC-24 receiver. The remote hand unit has channel tuning (the receiver is continuous tune, not detent tuned), audio (sub-carrier) tuning and polarity switching. The front panel also has the polarity switching with a pair of buttons (one way for clockwise, the other for counter clockwise). The receiver can be used with either DC (polarity) motor drives or the servo with pulse approach.

Finally, the receiver has an 'S' (signal level) meter plus a scan-tune feature. The scan rate is rapid, about twice through the band per second. The RF modulator outputs on either channel 2 or 3 and there is a set of baseband (audio plus video) outputs as well.



REAR OF RECEIVER is slightly confusing and you should read the manual before assuming anything.

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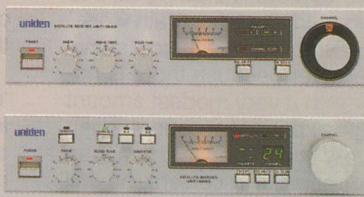


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ELC-24 Operation

There are two primary strengths in favor of Hayden McCullough:

- 1) When you deal with the company, **you are dealing with Hayden.** That means you are buying from and complaining to the same man who designed the circuit. There is no extensive 'chain of command' here (although certainly Hayden does have many good people working for him). Some dealers like being able to deal 'direct' with the guy who did all of the 'brain work.'
- 2) A dealer with just a medium amount of technical savvy will like the McCullough receiver because there is nothing inside which a dealer with a very modest amount of test equipment, plus some experience, cannot repair on his own. The circuit is very straightforward; if a man understands the **basics** of satellite receivers, he will fully understand the ELC-24. In a day when many suppliers are using 'secret IC devices' (with the numbers rubbed off), 'trick circuits' to outwit offshore copiers (and to inflate their designer egos) it is refreshing to find a circuit which continues to be 'basic.'

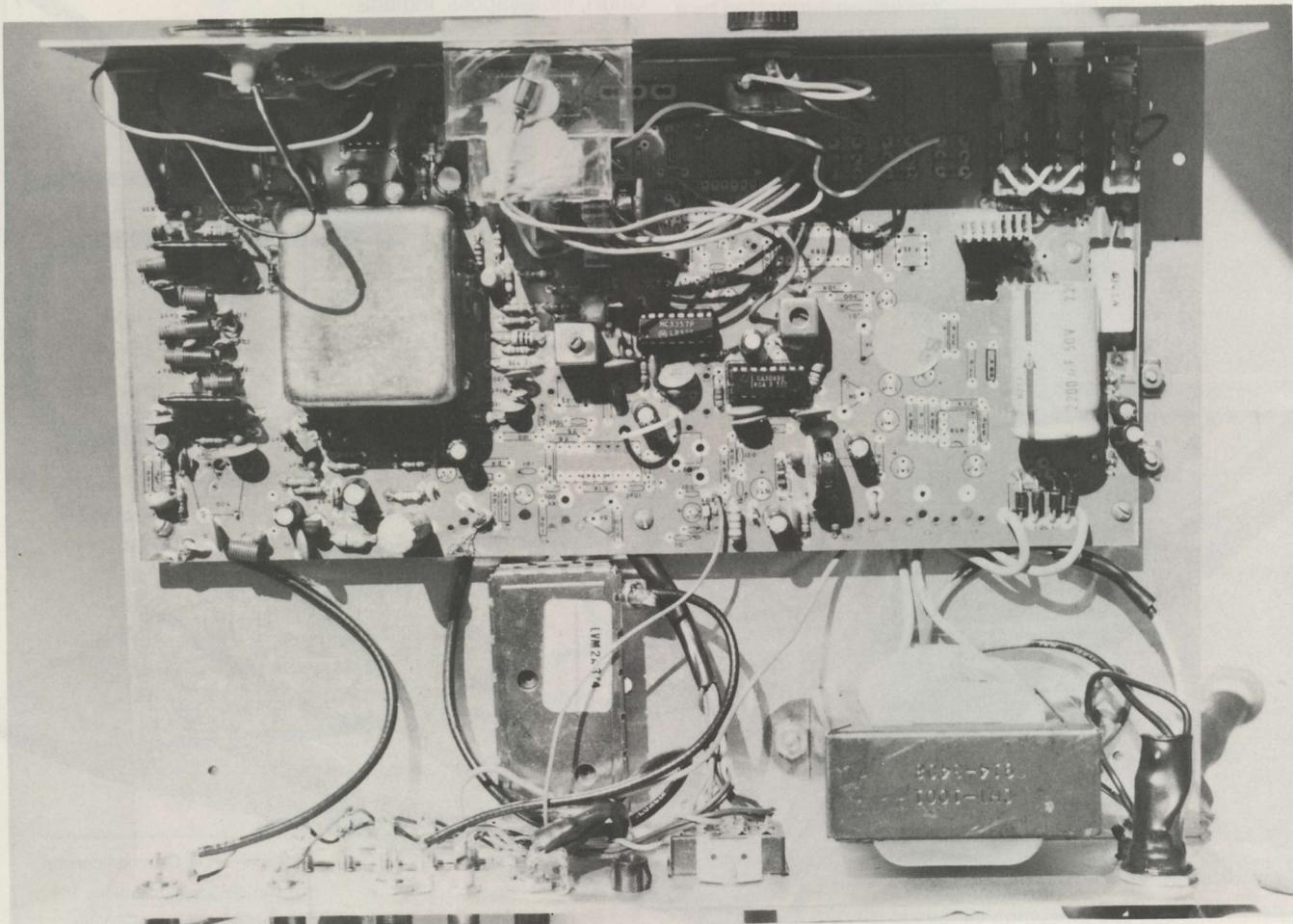
It might be unfair to include the ELC-24 in the same issue, much less the same 'review article,' with the prior COSMOS II unit. Having extolled all of the 'clever engineering' in the COSMOS II, and having made it plain that there are several 'trick circuits' in the COSMOS II which are well hidden from the prying eyes of copiers, one might rightfully expect that all of

those trick circuits in the COSMOS II do result in better performance than say one would expect with the basic ELC-24.

And, to be blunt, the ELC-24 is not in the same picture class as the COSMOS II. But then, to the best of our measurement ability, nothing else is either. A more favorable comparison for the ELC-24 would be a Drake ESR-240 receiver. The two, for performance comparison (and circuit analysis) are essentially alike. Not identical, of course; just in the same league. If you are a dealer who is happy with the performance of the 240, you are probably a dealer who would be happy with the performance and features of the ELC-24.

Our initial reaction to the ELC-24, after having allowed it to 'cook' for several days, was that the picture was 'grainy'; that is, a baseband noise which created a small but discernible amount of 'busy-ness' in the background of the video. We pondered why and decided that because the **IF gain control** lays 'across' the input line, ahead of the first indoor 70 MHz amplifier stage, it was conceivable that by reducing that (IF) gain control too far, you could be within the 'noise floor' of the first IF amplifier in the receiver. This is a 2N918 bi-polar stage and the input circuit is loaded down with a 75 ohm resistor to establish 'match.'

The receiver also has the usual video gain control (in the second 2N2222 video amplifier). There is also the **possibility** that an incorrect balance in the IF section (created by the setting of the IF gain control) could result in baseband noise being enhanced (but not created) by the placement and set-



ELC-24 receiver board has plenty of 'open space' and technicians should have few problems working on unit.

ting of this video gain control.

There were two other possibilities since the 'noise floor' did seem like it could be improved. We talked with Hayden McCullough about our observations. The 2N918, the first gain stage inside of the receiver, could be creating more noise than it should. It, however, is actually the 'second' 70 MHz gain stage since **out at** the downconverter there is an (NEC) MC-5801 IC. Hayden places this thick-film integrated circuit at the down-converter to help make up for the conversion losses in the 4 GHz / 70 MHz image reject mixer, and to allow you to run (in his case) up to 300 feet of RG-59/U between the downconverter output and the demodulator (receiver) input.

The 5801 operates as a (gain) 'flat amplifier' from 40 to 250 MHz. It is internally matched to 75 ohms (input and output) and should have a typical noise figure of 1.5 dB. However, suppose the noise figure (for whatever reason) was higher than this? If the noise figure was appreciably greater than 1.5 dB (due to some failure within the 5801), that would account for the grainy video. **We replaced the 5801 in the downconverter** to see what changes there might be.

The video grain promptly cleared up. For whatever reason, we had a not-up-to-spec IC in the downconverter.

The lesson here, which we pass along to you, is simply this:

- 1) Because the package (downconverter plus receiver) is 'so basic,' you don't have to be an electronics genius to figure out probable causes of problems. Furthermore, because of the construction techniques used by McCullough, it is only a few minutes time to change out about **anything** in the receiver which might need changing; or which you think might need changing.
- 2) The parts used are readily available in most locales and under \$50 in raw parts, sitting above your work bench, would probably cover all of the special 'microwave type components' which you would not find at a nearby Radio Shack.

OPTIONAL

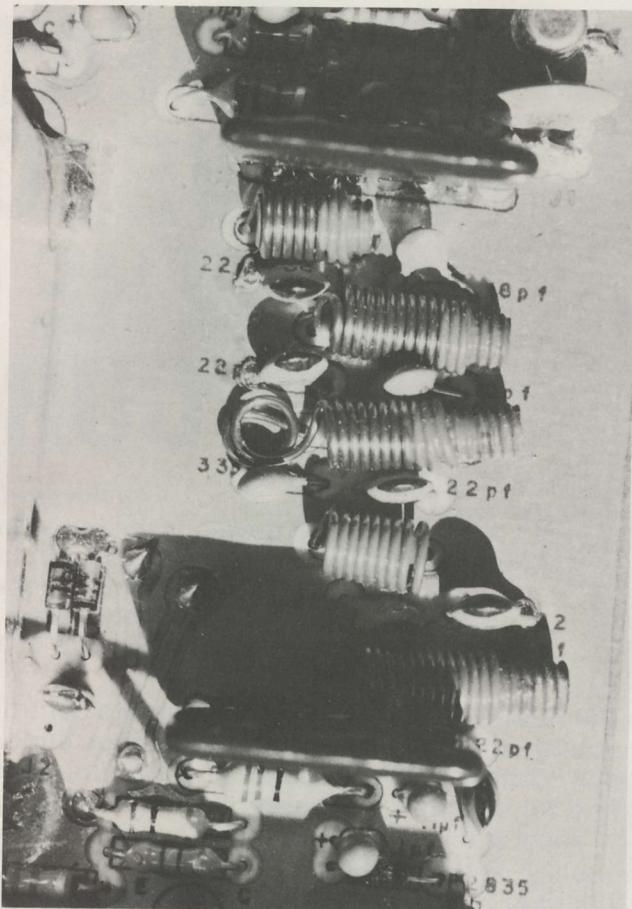
In addition to the basic receiver described here, the ELC receiver unit is also available with an antenna positioner control circuit (model **ELX-24S**) using a potentiometer mounted at the dish (500 ohms) which tracks with a receiver mounted pot (5K, adjustable) and meter to show relative dish position. And, if the built-in monaural sub-carrier tuning system (tunes 5 to 8 MHz) does not satisfy the customer, there is an optional second audio circuit which gives the user a pair of audio controls for tuning in both discrete and matrix audio sub-carriers. All of this fits nicely, and easily into the basic receiver board (shown).

PERFORMANCE

Adequate, but not outstanding. The video and audio are both clean, even with reduced input levels. Let's look at particulars.

The photo here depicts the modest grain level in the video; something we **were** able to clear up. The photo cannot show that while the manual tells you the nominal VCO tuning voltage varies in the range 5 to 15 (VDC) the unit we tested varied between approximately 3 and 8 volts DC. As you might suspect, that caused a problem.

A tuneable receiver, using the Avantek 1506 oscillator for the LO source, has to have both an operating voltage (that's extracted from the +24 VDC fed up the coaxial line) **and** a tuning voltage (sent through the second coaxial line). The tuning voltage is set for both 'low tracking' and 'high tracking'



IF SECTION for ELC-24 is straight-forward; slug-tuned coils adjust for bandpass filtering while 5801 thick-film amps (thin, black devices top and bottom) provide gain.

with a pair of (5K) pots mounted on the circuit board. Many other receivers do it the same way.

The 'trick' is to get the **proper tuning voltage** to the VCO (1506) at the end of the coaxial line carrying the tuning voltage. There will be a minimal voltage 'drop' through the line, but since very small voltage changes in that line correspond to the changing of channels (between 0.35 and 0.4 volts change in the case of the ELC-24), you do need a 'calibrate control' inside in the receiver. That's what the 'high set' and 'low set' pots are for.

The next 'trick' is to get the two (5K) pots to 'track' so that receiver dial calibration is 'on' for both the high and low ends. Consumers that find The Nashville Channel at 0 and WTBS at 22 are not going to be happy, long. Especially if in the process they lose HBO on 24!

We found a fair amount of difficulty getting the ELC-24 controls to track. We finally decided that our voltage range was not going quite far enough, since we were, indeed, losing transponders 23 and 24. The factory-settings were close but not close enough. Seemingly, with such a basic circuit, we could figure out how to make it right again.

We did, again pointing out that if you understand the basics of TVRO receiver design, you will never feel frustrated or uncomfortable with the ELC-24. Better than that, **if you want to learn the basics** but have been unable to get 'started'

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also got scan and seek capabilities, polarity reversal, format switches,



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THE SSD.

The SSD is the non-remote version of the Sky Eye X with many of the same terrific features. It has detent tune, skew control, polarity reversal, and single tunable audio. It, too, is quartz synthesized, which gives it that absolutely stable picture quality.



The Sky Eye X is manufactured in Japan by the Pioneer Corporation. It's not only



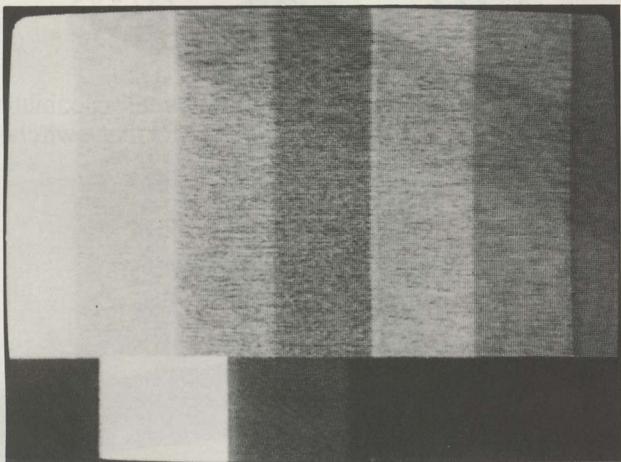
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GOOD GRADE video is acceptable if not high definition; video grain disappeared with replacement of thick-film gain stage in downconverter (see text).

because of the typical 'trick circuits' and 'hidden technology' of many of the better known receivers, the ELC-24 would make an excellent 'training ground' for you. Equipped with the receiver and a copy of the schematic, you can 'logic' your way through the full receiver in short order. Then, having trained yourself on the basics using the ELC-24, you are ready to tackle the more complicated 'trick circuits' from those OEMs who insist on hiding the 'basic functions' from scrutiny.

This caution. McCullough uses some relatively sophisticated 'soldering aids' to mount some of his parts (such as the NEC 5801 built-gain amplifier). You never want to 'dig into' such a circuit equipped with a soldering iron generating more than 25 watts of 'heat' and it needs to be equipped with a 'needle point' as well since many of the pin connections are very close together. Additionally, (5801) devices are often soldered on both sides of the circuit board (top and bottom) so you have to free the bottom first and then go to work on the top (where the piece mounts). This requires a 'solder sucker' and some patience to get the tiny globs of molten stuff out of the holes before you can replace a part. If this type of 'surgery' is new to you, you'll learn all about soldering in the process as well (and perhaps ruin a component part or two)!

The ELC-24 receiver provides good value for the money and dealers who are looking for something they are 'not afraid of' would do well to look into it as a functional building block in their own sales packages. Hayden, like many of the proprietor-

ELC-24 SPECS	
INPUT RANGE	3.7 to 4.2 GHz
INPUT LEVELS	not specified
INPUT MATCH	not specified
IMAGE REJECTION	not specified (single conversion)
CONVERSION GAIN (NOISE) BANDWIDTH	not specified (14 dB measured)
THRESHOLD	30 MHz
VIDEO OUTPUT	not specified (10 dB measured)
BASEBAND OUTPUT	not specified (1 v p-p adjustable, measured)
DISPERSAL CLAMP	not available
VIDEO S/N	not specified
DIFFERENTIAL PHASE	not specified
DIFFERENTIAL GAIN	not specified
FREQUENCY RESPONSE	not specified
SUBCARRIERS	tunable 5.0 to 8.0 MHz
HARMONIC DISTORTION	not specified
AUDIO OUTPUT	not specified
AUDIO BANDWIDTH	not specified (240 KHz measured)
AUDIO S/N	not specified
FREQUENCY RESPONSE	not specified
POWERING	120 VAC, 25 watts
CONNECTORS	4 GHz (N); 70 MHz (F/F); Powering (F) + terminals for polarization control; RF out (through internal modulator) (F); Audio and Video (RCA).
RF OUTPUT	Channel 2 or 3 (switchable), +5 dBmV measured
PRICE	\$380 range
SOURCE	McCullough Communications, Route 5, Box 97, Salem, Arkansas 72576 (501/895-3167)
CSD RATINGS	
1) Video Sensitivity	In top 40% of all receivers tested
2) Video Color Quality	In top 30% of all receivers tested
3) Video Stability	In top 30% of all receivers tested
4) Audio Sensitivity	In top 40% of all receivers tested
5) Audio Quality	In top 30% of all receivers tested

operated businesses in TVRO, is available for consultation much of the time and if the frustrations of talking technical problems with an 'order taker' who doesn't understand the product has bitten you, there is considerable dealer-value here as well.

McCullough will survive, inspite of the threat of foreign imports, **for as long as he wants to survive**. He has found a receiver 'nitch' which will last many additional years, is comfortable with modest production runs and maintaining a relatively low profile. The industry is 'better' because he is a part of it.

ON The Road Again

Last month CSD began our visit to **Luxor Electronics** in Motala, Sweden with a report on the recent history of the firm, and their broadly based production skills in a wide variety of electronic products. This month we concentrate on their 'marketing philosophy' since that has been one of the major 'differences' cited by the firm when they compare themselves to North American TVRO manufacturers.

Service, repair and warranty back-up has been a 'problem' for TVRO dealers for as long as there has been TVRO hardware. In our annual look at dealer 'attitudes' towards various suppliers, we found that **R.L. Drake Company** was the most universally respected supplier, among dealers, for factory repair and backup. Luxor rated 'poorly,' number five behind Drake, Automation Techniques and Avcom models for 'receiv-

**LUXOR MARKETING:
'A DIFFERENT MOLD'**

er acceptance' and number one in the 'least respected receiver' division. Worse than that, they rated second only to KLM for 'worst warranty service.' Clearly, **this did not sound like** a company which felt very sensitive about their field back-up of dealer problems.

Of course the 1984 survey, taken during the month of May, came at a time when Luxor was in the midst of a messy 'separation' from their exclusive importer (**STS of Missouri**) and as past issues of CSD and CSD/2 have reflected, neither STS nor Luxor escaped 'whole' from that bitter disengagement. Unfortunately, for Luxor, the bitter memory of the transition period (February through early summer), where STS was phased out of the warranty cycle and repair process, has lingered and there continue to be many distributors (and more dealers) who recall their problems with Luxor products.

Luxor, since that time, has faced a 're-building road' which has continued to this day. We asked the question in our part-one report 'Can Luxor Come Back?' and indeed that remains the \$64 question today.

Luxor quality-control problems can be laid in two areas; the downconverter, and, the receiver proper. As we noted in December, the downconverter has always been a North American product. Luxor's **Bo Lindqvist**, Technical Manager for Luxor Satellite, confesses that he has spent many weeks in the states working on downconverter design problems with their downconverter supplier; **Magnum Microwave**. The primary problem has been downconverter **stability** and even to this day there is apparently not complete satisfaction, on Lindqvist's part, with the downconverter being shipped. He continues to see room for improvement.

A companion problem relates to the difficulty all off-shore receiver manufacturers face when building even 70 MHz input (IF) receiver electronics. There is no substitute for doing final receiver transponder alignment, on each and every receiver, using a 'full bird' such as F3R. All off-shore manufacturers have invested in 'satellite simulators,' boxes that create **laboratory-perfect** 4 GHz signals on a few or all 24 satellite transponder frequencies. Unfortunately, satellite simulators must themselves be 'calibrated' fairly often (because of internal stability problems in the simulator), and, even when they are 'dead-on,' they will not and do not match the actual transponder frequencies in use by many of the transponder operators (some transponder services, such as MTV and ESPN, may be 'off frequency' by 5 MHz or more at any given point in time. Very few are 'dead-on,' and therefore a 'simulator' cannot simulate the **real-world**; only the **laboratory** world.). The end result is that no matter how carefully the simulator is calibrated, and how carefully the off-shore alignment tech does alignment, there may **still be** a need for a secondary re-alignment of all offshore receivers when they land in North America (**Uniden**, for example, does this on 100% of all units landed, at a facility in Indiana).

Luxor learned this lesson early and thus there is a 'Swedish burn-in' of the receivers followed by an alignment, and then a new 'burn-in' followed by a new alignment when the receivers come out of the SAS Jet Cargo container after landing in Chicago.

Burning in and re-aligning receivers from off-shore manufacturing centers has become a standard operating procedure for all quality off-shore units with a 70 MHz IF. BDC units **with continuous tuning** often escape this stateside/Canada procedure simply because there are no **individual transponder** settings to tweek or align when the unit **continuous tunes**. In the case of the Luxor **9550** receiver, in the states is the first time the full receiver plus its matching downconverter are



checked together, as an integral package.

If simulation of actual fully-loaded satellites is difficult offshore, the simulation of the satellite locations is not. In the case of the Luxor **9534** antenna actuator, we found every unit in Swedish production undergoing a thorough satellite by satellite 'check' using a simulated test fixture that pretended it was the full arc of satellites in the sky. The motor drive is a US product, and it like the downconverter is married to the package **after** the controller (9534) arrives in the states.

In a sense, this double-check system may be a more severe type of 'QC' (quality control) than made-in-America products receive. A visitor to a US production facility would probably be amused (if not amazed) to find benches of alignment technicians doing final 'QC' at the ends of feeds from satellite antennas pointed (typically) at F3R. One finds the same final alignment procedure at on-shore testing points for firms (such as Luxor) but you must keep in mind that this final check is done some weeks (or months) after 'simulated' signals have been fed into the same receiver at the point of origin.

Still, users do find problems and there is a certain amount of infant mortality when any type of unit comes out of its shipping carton. How can this equipment go through so many stages of 'performance verification' and still comes out of the box 'broken'? We pondered this while we were learning about the parts and service aspect of Luxor.

Ake Lindgren is responsible, at Luxor Motala, for the parts aspect of all Luxor products. Lindgren's job is to keep track of all replacement parts, and to forecast (accurately) the type of parts that should be stocked for warranty and out-of-warranty repairs. His department routinely stocks parts for models which have been 'out of production' for periods of ten years or more. He notes that Luxor's philosophy has always been for the 'long haul' in any business venture and when a new product is planned, he knows that his parts department will be involved with that product for no less than ten years; far longer than any other segment of Luxor. Feeding the large, worldwide network of Luxor service centers and affiliated distributors and dealers, he averages 300 separate orders per day or 75,000 per year. Naturally, all of the 'controls' are handled by computer these days. Scandinavian orders placed for parts by 10 AM in Motala are shipped the same day and received the next; expedited shipments to overseas points are routinely delivered worldwide in 3 days. An 'average' parts-replacement inventory, production parts aside, is around \$7,000,000 (US).

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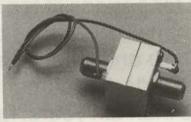
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PARTS BACKUP is his job. Ake Lindgren runs a computerized parts system that forecasts how many parts will fail per module per year. And it works!

orders is one part of the dealer backup; dealer training is another. Stig Karlsson heads up the dealer training program in Europe and the Mid-East. The Luxor training in North America for TVRO units is presently handled by Luxor North America so we looked closely at the way Stig handles the TV and consumer product training for signs of what is likely to be the long-term policy in North America as well.

Stig relies heavily on training seminars, conducted all over the selling regions. He takes his dealer training to the dealers and conducts one day (or longer) seminars to help them better understand the products they sell, and ultimately, must service. One of the 'tools' we saw for this program was a set of testing jigs developed for the TV receiver products. The concept is pretty basic; just as satellite transponders or satellite positions can be 'simulated,' electronically, at the Luxor plant, so too can faults be simulated in a test jig. Because the Luxor receiver products are largely cable-harnessed so that a single multiple-wire cable (and plug) carries all of the input and output signals and voltages, so too can the receiver boards be plugged into a test jig/simulator. In effect, a mini or micro computer takes the receiver technician through a stage by stage check of all the product automatically. Product faults are quickly isolated by the test jig simulator and once the faulty 'region' is found, part-by-part elimination can be done.

This type of approach will one day come to the TVRO receiver line. This will mean that a dealer, with a minimum of hard technical training, will be able to 'simulate' product faults or failures with a test jig system and isolate his own problems without having to depend upon a distant factory warranty center.

Leading into that type of automated circuit analysis is in the planning stages now. Ahead of that, we asked about the basic dealer training sequence for consumer products in Europe, by Luxor.

Karlsson and Lindgren explained for us.

"Before a new product is shipped into the marketplace, we routinely hold special dealer seminars. This means that we take the new products to a central location and dealers come in to inspect the products. We break the sessions up for the sales people, the service-center people and finally the service specialists.

"Sales people are given a complete explanation of the product features and they are also given a 'light touch' of the technical since we expect our sales people to know more

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about the inner workings of any product than even the most educated consumer. The service center people are then exposed to a detailed analysis of the product and a stage by stage 'walk-through' on how the product has been designed for the various user functions.

"Finally, the service specialists are trained using the service jigs in locating faults and problems, diagnosing failures and making repairs. All of this is done **before a product is delivered** to dealer showrooms and the public is asked to inspect and buy."

That was a revelation. An approach that was 'not so much in a hurry' to rush a product to market that the products ended up there months (or years) before the servicing information! But could a fast-moving field such as TVRO receiver technology afford that 'luxury' of delay? Certainly it took longer to do it 'this way' than to ship product first and worry about service later.

Karlsson suggests that while you may not **initially** enter a brand new field (such as TVRO) with that kind of preliminary training program in place, he feels that as any product and industry matures, this type of training becomes essential.

"The difference between products of differing manufacturers narrows" it is noted "as a field matures. It then becomes necessary to focus on innovations that help keep products sold **after the sale.**" In short, innovations in product **design** may sell a product when the 'field' is new; innovations in **service** and field equipping of service personnel becomes more important as any field grows older.

We were reminded of this by Luxor's **Per Cederlund**, the man largely responsible for consumer television set design (research and development). "Our digital control systems aside, the primary difference between differing brands of television these days is not what you see **on** the screen, but what is **inside** of the cabinet. Consumers are attracted by ease of use and ease of familiarity with the product's features. Retailers, and their service personnel are attracted by different things; the amount of time it takes, for example, to trouble shoot and diagnose a faulty unit.

"**If we can design** our receivers so that they require 50% of the time to diagnose and repair, we are more apt to have a loyal dealer than if we add two more buttons to the remote control the consumer uses. When you are in the consumer electronic business for the long-haul, you have to think as much about the friendliness of the product(s) to the retailer and his service people as you do about the product's features the consumer will see."

An interesting viewpoint and one which we had not heard in North American TVRO design shops previously.

All of this, of course, takes time. And it takes constant interfacing between a plant located in south-central Sweden and the market which is thousands of miles distant. **Hans Giner**, who heads up Luxor North America's operations out of the Bellevue, Washington headquarters emphasizes this point.

"**We felt our initial receiver products** were as good as any on the market when they were first introduced, and years ahead of most in customer features. We prefer to allow a product to mature, slowly, like a fine wine rather than come out every few months with startling new technology and changes. We are in this for the long pull and we are ready to make our place in this industry by building a solid, dealer and consumer oriented business."

Stig Karlsson would add "It takes a great deal of money to run a training department, to prepare training materials and travel all over the world giving training seminars." To make the



training and performance run smoother, Luxor has adopted a 'service-specialist' approach. In Austria, for example, one man is the primary liaison between Motala and the middle and eastern European TV dealers. This man concentrates on just the TV receivers in the Luxor line and he travels throughout the region visiting dealers, helping them better understand servicing problems, and staging small dealer training seminars on a scheduled basis.

Karlsson on the break-in period.

"When any new type of product is introduced, such as color television sets some years ago or computers more recently, there is a double standard practiced. First, you have to be concerned that nobody else in the marketplace is getting ahead of you with the technology. That's the job of our engineering and research and development people. Next, you have to be concerned that as you keep creating all of this new technology that the retailers and their service people do not become disenchanted with the innovations because they fail to understand how to cope with them. That's my job."

Again, the TVRO marketplace in North America must come to mind. Here we are in the midst of considerable technological innovation, changes heaped upon changes and more and more features designed with the consumer in mind.

Bo Lindqvist on the constant changes in product design.

"I think there is a plateau coming in new innovation. I must recall that when we were first ready with a TVRO receiver (for Ku band) in 1979, that we had settled on the BDC (block downconversion) technique. We thought it the best way to go then, and I still do today. But the downconverter technology, largely because of the microwave parts then available, was not adequate to support large scale production of this design at that time. Now, five years later, it is all coming around. And we find that the BDC receiver system is rapidly becoming the established designer's favorite. I would not be surprised to see virtually total abandonment of the single conversion, 70 MHz IF approach in the next 18 months. The only thing that remains to be sorted out, in my mind, is the widespread approval of a particular IF for the receivers. I happen to believe that the 950/1450 (900/1400) MHz band will be the eventual winner."

Lindqvist, responsible for TVRO receiver product creation at Luxor, is already past the next basic adaptation of the BDC design and the next group of products which Luxor can be anticipated to show for the first time at the March 31/April 2 Las Vegas industry trade show.

"Once we have the majority of the receivers being built

LUXOR/ continues on page 42

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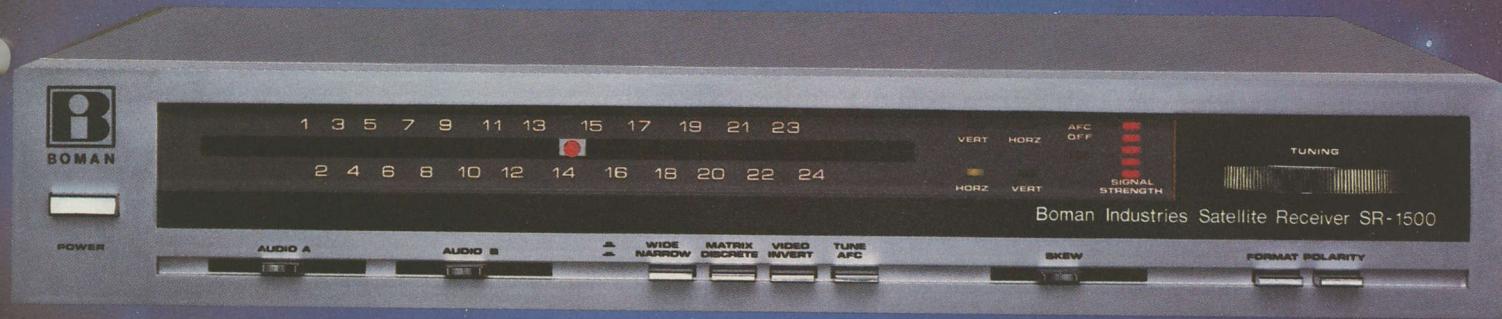


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using this BDC technology, it will become more and more acceptable to mix components from one supplier to another. I believe we are heading closer and closer to a basic, 'universal,' 4 GHz TVRO receiver which will, by the way, also end up being a basic, 'universal,' 11/12 GHz receiver as well."

Karlsson and Lindgren talked about the service policy for consumer electronics sold by Luxor in Europe.

"We back up all products such as television sets with a one-year full warranty. We equip our dealers with sufficient equipment and training so that they are able to effect virtually all of the repairs in the field, at the local level. (The one year warranty is scheduled to become a two-year warranty in 1986.) In the computer field, Luxor again urges the dealers or regional service centers to make repairs. The service shop turns into Luxor a statement showing the model and serial number, and the work done. There is an established (by Luxor) service rate, payable to the dealer, for different categories of repairs. This takes into account the amount of time which the factory people know a certain repair should take."

In the case of the TV sets, there is a 'service fee' built into every new set shipped to a dealer. It typically amounts to \$152 SK (just under \$20 US) per (TV) receiver.

"In theory, the dealer should be banking this money each time a receiver is sold from his shop and then it is available to him, within his own organization, for repairs as required in that first year warranty period. Some dealers, of course, simply carry the \$152 SK service allotment as a 'prepaid service income' credit on their books. If the receiver goes through the warranty period without requiring service, the dealer has just earned an extra \$152 SK per receiver. But we find that this is a very realistic number, based upon hundreds of thousands of receivers shipped, and that the dealer comes out about even with this policy."

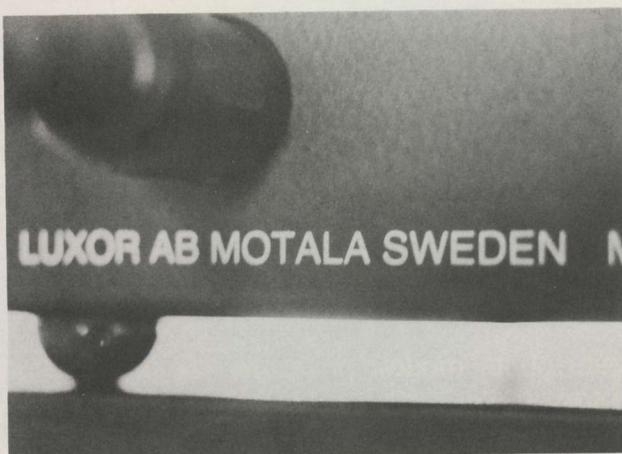
What about TVRO products? When would the North American TVRO dealer see some number of dollars per receiver 'discounted' in return for the dealer being responsible for the first year's service?

"First we need more service experience and better servicing records" notes Karlsson. "You have to get from where we are, which is a dealer universe where there is virtually no dealer ability to service inside of a receiver, to a dealer world where the dealers are not only trained but interested for their own survival in being trained" notes Lindqvist.

Luxor currently is supplying a 'top of the line' service manual to dealers handling the product line. It includes full schematics and full parts lists (something many others **still** do not do). But it is a far cry from Stig Karlsson's 'traveling road show' that breaks down service problems into audio-visual displays and Per Cederlund's cut-away models of TV receivers. Giner sees all of that coming, soon.

"This industry has telescoped a normal decade of development time into two or three years at the most. There has been tremendous product innovation for what has, in the consumer world, been a very modest total production base. We are seeing product design innovations in this field which normally only happen over much longer periods of time and with hundreds of thousands of units produced per model. Having our experience in supporting dealers and reaching consumers, it is especially frustrating to us to see so much change so rapidly, with so few products actually being produced."

The 'giant TVRO test tube' perplexes Lindqvist as well. "I **will welcome the slow-down** I see coming in complete product upheaval because I believe that will lead to a far better, far



more reliable product for the consumer. When a marketplace is driven, driven, driven by new changes and new innovation, it is more difficult to develop the kind of customer support and dealer support which we are so firmly committed to in Europe. It is probable that as the products mature, those companies which are today very visible because they are design-driven will become far less important in the marketplace. The era ahead is a '**Luxor era**' simply because **we are ready** for a marketplace where **the dealer is as important to us as the ultimate consumer**. The stability will be good for all of the survivors."

One of the primary areas where product stability will benefit Luxor is in their computer aided design department. As Per Cederlund explained, "In 1973 our standard TV chassis had 1663 electronic components. By 1979 we had reduced that to 886 and the 1984 models have but 624 parts. At the same time, we reduced the number of cable tie-points within a receiver from 160 to 37. Any time you reduce the number of parts and the number of cable connection points in any electronic product, you are going to make the dealer happier because he will have far fewer product failures. The more you understand about a product, the better able you are to pinpoint problem areas and eliminate those trouble spots."

All of that comes with product maturity, or the ability to freeze on a 'basic design' and then proceed with time to reduce the basic design to the minimum number of parts with the minimum number of connection points. Cederlund sees that coming soon to the TVRO product line.

While the number of component parts and connection points have dropped, so too has the amount of production time per unit. The TV set, their biggest volume item at Luxor, provides a lesson once again.

"The 1984 TV receiver has 20 alignment or technician touch-up points" notes Cederlund. "The 1979 receiver had 40. Now we have reduced the total number of production hours per receiver from 7.5 hours in 1973 to 1.7 hours late in 1984; even this year alone, we have trimmed 3/10ths of an hour out of the production time."

"The biggest challenge in the **next generation** of (Luxor) **satellite TV receivers** is to bring those same sort of economies to the design. Just as we have learned that product reliability increases in TV sets by reducing the parts count and consolidating the layout to reduce wire and cable connections, so too will that apply to the satellite receiver products."

There are 'two curves' here working against one another. In any early product development, the number of parts required to produce the end result is always high. So too are

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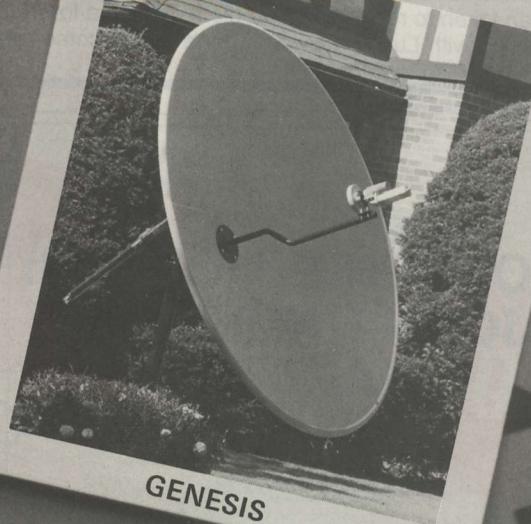
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service problems since service-faults and parts-count parallel one another. As the production dollars come out of the products by reducing parts counts and trimming the number of hours per produced-unit required in factory creation, dollars go up in the field and service pursuit areas.

"We do not have the luxury of simply throwing out parts, and trimming hours per product, and retiring on the 'savings'" it is noted. "Rather, as the direct costs come down because you learn more about your product(s), the indirect costs (associated with supporting the distribution and dealer organization) goes up. We might end up saving \$10 per unit by removing parts, but at the same time that is happening, we are adding \$10 per unit for the field training and servicing organization. There are two separate 'curves' here going on at the same time and as you bring one down, the other just naturally rises. That's the nature of electronics manufacture and distribution in the consumer field."

Luxor's Future

Contrary to anything and everything Luxor Electronics AB had ever done before, they allowed a product of their creation to be brought into an entirely new marketplace (i.e. North America) without their factory control. The product sold well (through the master distributor STS) and created a new awareness of consumer innovation in the process.

It is our judgement that the basic product, the TVRO receiver, is sound and that Luxor personnel in the US and Sweden are not only keenly aware of the limitations of the earlier-conceived downconverter 'arrangement' but that steps have been taken to resolve that problem once and for all (*).

In visiting with Luxor in Sweden, one has to come away

from the Motala facility convinced that there is more here than a million square foot facility occupied by 1,500 people who happen to like living in central Sweden. Behind the 'old-world-charm' of the people and the area, there is an interest in preserving a 60-plus-year tradition of excellence in the consumer electronics marketplace. There is a fierce loyalty to the quality of the products produced even if that loyalty does not jump out and bang you over the head.

There is no shortage of 'bright' and 'dedicated' people in Motala and there is an even more important ingredient; the 'luxury of tradition' which has taught these people that minor bumps and hurdles in the marketplace are not sufficient reason to drop out and go away.

Those doubting Thomases who have watched (perhaps with some glee) the misfortunes of Luxor and their former importer-distributor STS of Missouri during this past nine months will, we suspect, be surprised to find that Luxor's determination to be 'one of the survivors' in this field is no less today than it appeared to be 12 months ago.

Everything one sees in Motala dealing with the way Luxor handles their design, manufacture, sales and service in fields as diverse as home electronics and business computers suggests that Luxor is a 'long term player' with the stability and resources to stick with a product and field until they have everything running smoothly. Those who read anything else from Luxor activities in North America are, we suggest, not getting the 'full picture.'

*/ Luxor receivers now being distributed in Canada have recently switched to a **new downconverter** package being manufactured in Canada.

PIONEER'S PIONEER: JOHN RAMSEY of SAT-TEC

RECEIVER Pioneer

The very first TVRO receivers to be offered to the home or consumer industry were manufactured using designs largely 'borrowed' from existing technology. In the fall of 1979, receiver designer **H. Paul Shuch** had created a double conversion receiver which he licensed to **ICM** (International Crystal Manufacturing Company). The Shuch receiver had been designed around 'modules' which approached the first conversion, high IF, second conversion and 70 MHz IF as separate functions. That basic receiver design would last approximately one year until ultimately ICM would switch to a **Taylor Howard** design to get around the relatively expensive modular approach of Shuch.

Andy Hatfield, meanwhile, was building his first AVCOM receivers and his technology stemmed from earlier work done



ONCE THEY SHARED/ John Ramsey (right) with Taylor Howard at SPTS '80 in San Jose. Ramsey told the group "We hope to be able to gear up to 200 TVRO receivers per month . . .".

by receiver suppliers such as Scientific-Atlanta and Microdyne. Hatfield had made an effort to reduce the parts count and receiver complexity and because of his success in doing this he had been able to come out with a receiver several thousand dollars lower than the commercial models.

At about that same time an engineer with Harris named **Clyde Washburn** had designed his own double conversion receiver. Washburn was a designer and not a manufacturer and he had found a firm in the suburbs of Rochester to do the actual receiver production. The firm was **Ramsey Electron-**



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ics and it was headed up by **John Ramsey**.

All three receivers (initial ICM, AVCOM and Washburn) shared one common trait; they had taken the 'semi-elegant' approach to design and all had substantial parts counts; even after their designers had attempted to reduce the parts count (and therefore costs) from the existing commercial units. John Ramsey came into this scene as a contractor to build the Washburn receivers but in his own mind he had an entirely different approach to TVRO receivers.

Ramsey had been packaging electronic kits and assembled units largely for the amateur radio ('ham') market for many years. One does not compete in that particular market, successfully, by placing large price tags on equipment. It is the nature of the ham ('do-it-yourself') market that if a product costs very much more than the 'raw parts cost,' the market will simply 'do-it-themselves' rather than buy the completed products. John had learned this lesson early and he brought that same discipline to his own TVRO receiver design.

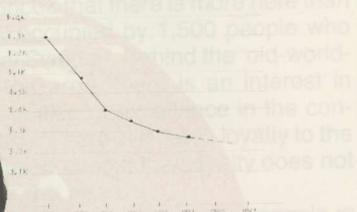
The Washburn contract was possibly 'doomed' from the beginning; Clyde had **his** concept of how the product should go together and function, and John had **his** concept. John recalls that the closer they came to releasing the first of the Washburn units the more 'changes' Clyde wanted incorporated into the product. Ultimately, the two would 'part company' and Washburn would take his receiver to **Cincinnati Microwave** where it has been produced consistently from virtually the first production models to the present time.

Freed of the Washburn contract, that allowed Ramsey to introduce his own receiver design. John's approach to a TVRO receiver was far more 'basic' than others in the marketplace at the time. His approach reduced the parts count by 50% or more, and this brought the price down. He began advertising a \$995 price tag in June of 1980 while others were still in the \$1995 region. One of the immediate effects of this was that ICM shifted from their Shuch design to a new Taylor Howard design and within a month of the initial Ramsey (i.e. Sat-Tec) announcement, ICM would **also have** a basic receiver at the \$995 price point.

Ramsey refused to accept the popular belief that a single conversion receiver (introduced shortly after his \$995 model) was in fact 'that much cheaper' to produce. He continued with the double conversion design, finding ways to reduce costs in it and not willing to accept the single-conversion trade-offs that others were eagerly adopting. He would eventually end up being able to build double conversion receivers for virtually the same dollar costs in parts and labor as the simplified single conversion units.

This was an era when receiver designers, that handful of people who had the necessary skills and talents to design TVRO receivers from scratch, freely conversed with one another exchanging information openly. It is therefore difficult to determine whether it was John Ramsey **or** Taylor Howard who first conceived and then made work something called '**divide-by-two**.' This was a technique to make the popular phase lock loop demodulator work more efficiently than it would left alone. The PLL device, by then the near-unanimous choice of receiver designers for the demodulator (IF to video) 'conversion,' was not always reliable with a 70 MHz 'center frequency.' The PLL ICs varied in quality from one to another such that one worked fine and the next one worked not-so-fine. The result was pictures that were good on one receiver,

Incremental Receiver Pricing



FREE 11 x 14" 'Pioneer Poster' prints/ see page 48.

and pictures that were grainy on the next. Ramsey and Howard both correctly surmised that **if** the IF could be lowered, so the PLL was not having to 'work so hard' at such a 'high frequency' (i.e. 70 MHz center), that variable would be eliminated.

Out of this free exchange of analysis between Howard and Ramsey came the divide by two approach; the 70 MHz IF signal was amplified and filtered and then electronically 'divided in half' (i.e. by 2). That resulted in a new IF at 35 MHz (70 / 2). Now the PLL could function more effectively and the variation they found from one receiver to another was eliminated since even the lowest-grade PLLs seemed to work properly at 35 MHz.

This technique found its way into both Sat-Tec and ICM receivers at about the same time in the fall of 1980, and pretty soon most of the other receiver manufacturers were using the same technology.

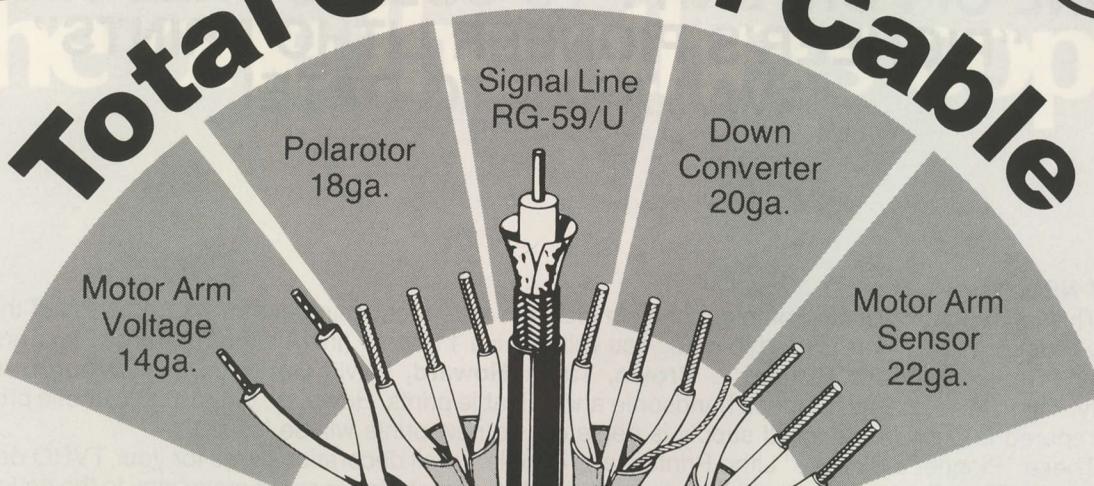
Ramsey's Sat-Tec remains a viable, growing business today, some five years after he first sat down with Clyde Washburn to figure out how the Washburn (Earth Terminals) receiver could be placed into production for the home TVRO market. Sat-Tec receivers remain the most 'cost effective' units in the marketplace, and they are often targets for offshore receiver copiers who have no or few talents of their own for receiver designing. John Ramsey, and wife Judi, have maintained their position in the industry by not losing sight of John's ultimate goal; a receiver that uses \$10 in parts and costs perhaps \$50 in the marketplace. With each new advance in 'component part' technology, and with the wisdom of having spent five years designing and redesigning TVRO receivers over and over again, he gets a little closer.

For his constant vigil in keeping the pressure up on the pricing of receiver units, John Ramsey becomes one of the "Pioneer's Pioneers" in our industry.



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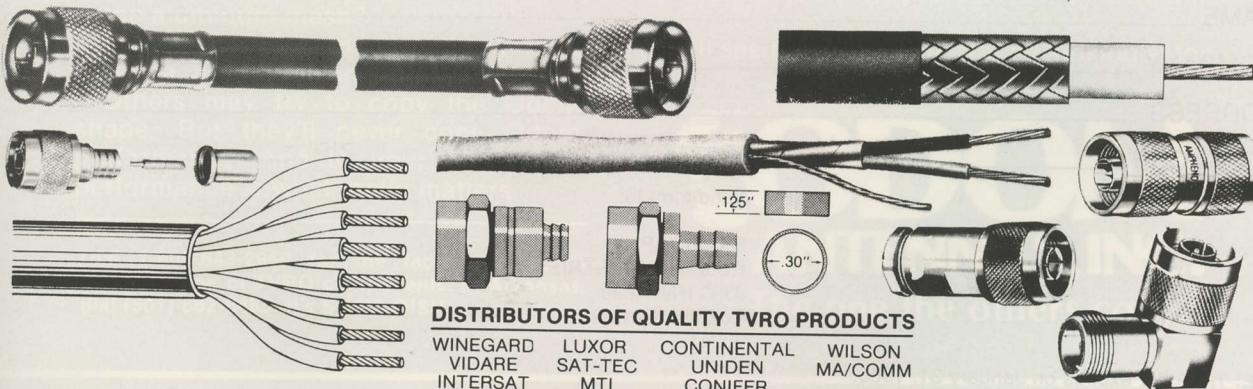
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These "Pioneer's Pioneer" Litho Prints make excellent wall decoration items for your TVRO dealership showroom or office. Each tells a 'story' about a man who has contributed in some major way to the development of home TVRO, its technology or legal status. Each of the seven Pioneers to date was present at the 'TVRO Fifth Birthday Party' in Nashville on September 3rd to receive his handsome award and to be recognized by his industry for his outstanding achievements. (**CSD** offers a full-production-quality two hour VHS format videotape covering this awards ceremony; see page 71 here.)

There is no charge for these prints; they are available to you courtesy of CSD Magazine and **Boman Industries** and all you must do to receive your own set of seven prints is to complete the form here!

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Complete the form below, filling in your name and mailing address. Answer this month's survey questions and send off to the **Boman Industries** address shown below. **Send no money;** there is **no charge** nor obligation for these prints.

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2) What **SINGLE** concept or marketing effort do you believe will have the **GREATEST** influence on market growth during 1985? _____

3) Do you plan to attend the March 31/April 1-2 SPACE/STTI show in Las Vegas this year? _____

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ESPN began dual-feeding on G1 (TR9) December and will eventually phase out F3R feed. MTV and Lifeline are only **major** cable services remaining exclusively on F3R.

BORESIGHT is latest television program created for and beamed to TVRO dealers. Program has 52 week contract to utilize TR16, F4 at 9PM eastern Thursdays; runs one hour. Producers were all over Dallas show taping material which should keep them interesting for next few months.

DALLAS KTVT moved from TR21 on F4 to COMSTAR D4, TR22, effective the middle of December. United Video, uplinker for KTVT, is eyeing possibility of other services on D4 as well.

SOVIET tests using 14 west location at 11 GHz part of master plan to create national three-channel network for distribution of television programming in 11 GHz assignment. **CSD** reported reception of 11 GHz test signals in December 1st issue.

WHILE TVRO sales during September were **not** breaking any

records, home video industry saw month as 'best ever' with color TV sets up 11.4% over any previous month. During last week of September, VCR sales came close to 300,000 units for highest single **week** in VCR history.

JAPAN plans 1987-8 launch of 'mobile satellite' allowing communications between car-vehicle or hand-held transceivers in 1.5/1.6 GHz band as well as inter-connection to fixed stations and terrestrial telephone circuits.

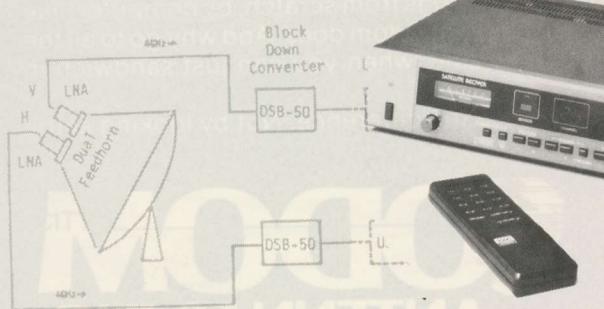
FCC report on video transponder loading (ie. use) for most recent quarter of 1984 shows decline in percentage of transponders in use for video. This was prior to activation of T302, Galaxy 2 and Spacenet 2 birds which when added to study in next quarterly report will further depress 'video statistics.' On other side of coin, there was marginal increase in transponders in use for non-video (ie. SCPC) carriage. Basic concern is that transponder 'glut' continues to grow while user requirements seems to have temporarily 'flat-topped.'

TURNER's Cable Music Channel (TR18, G1) may have set record



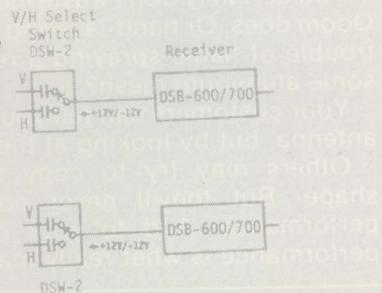
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for shortest life from a major service. CMC shut down December 1 after just over one month of service citing failure to attract sufficient cable systems for service as reason. MTV involved in shut-down, acquiring certain Turner assets and agreeing to promote themselves on Turner channels in future.

GTE Spacenet 2, now located at 69 west, is probably capable of being received in Europe but observers won't find regular video there; bird is largely under contract for 'Sprint' communications network.

CHINESE satellite system now out for bid; it will have two Ku TV channels on pair of birds with 230 watt TWTA output stages using single beam to cover full country. Chinese hold Ariane launch reservations for 1987 and 1988.

SPACE negotiations with three newspapers (**Los Angeles Times**, **Honolulu Advertiser** and **Honolulu Star Bulletin**) paid off; all three had denied use of their pages to 'home TVRO system sellers' prior to negotiated SPACE settlement.

SENATOR Barry Goldwater, fresh from 'victory' this past fall in getting consumer TVROs 'legal,' will now introduce legislation aimed at settling city by city zoning squabbles. Goldwater plans 'uniform zoning' law which would apply to all cities; bill is scheduled for introduction in Senate shortly after Congress opens.

RETURN to earth of rescued Palapa B and Westar 6 satellites dramatic example of 'Shuttle worth.' Birds are now being repaired and retrofitted for possible re-use. Insurance carriers own them; future owners not yet determined. Insurance firms paid out \$180M when both birds failed to achieve Clarke Orbit and may recover \$60M total when birds are re-sold.

NBC may step-up date to abandon F1R network feed (TR8) after recent analysis of performance of new Ku band terminals operating at more than 100 affiliates. Network recently suggested 'second quarter 1985' shut-down for TR8 feed on C band.

VIDEOconferencing is latest 'darling' of satellite business speculators; with special emphasis on small, transportable Ku band systems. Latest statistics show significant increases in use of technique during 1984 with far greater networking likely in 1985 and beyond.

Possible diminished use of 4 GHz for videoconferencing is suggested, making future transportable system operators more likely to be Ku rather than C band equipped.

ANIK C-2, currently the home for USCI service on Ku band at 104 west, will move to 110 west when USCI completes contract use of Canadian bird. STC meanwhile planned use of 110 west itself (at different 12 GHz rather than present 11 GHz C-2 frequency) for direct broadcast service.

HBO dropped around 100 employees plus 3% of its viewing homes (1984 versus 1983) in recently released announcements. First 100 VC2C descramblers delivered to HBO during December are now largely in field undergoing testing. TR21 of G1 has been used for VC2 scrambler tests since late in November; video appears 'similar' to Oak Orion system while audio is 'gone' in digital-enclosed format.

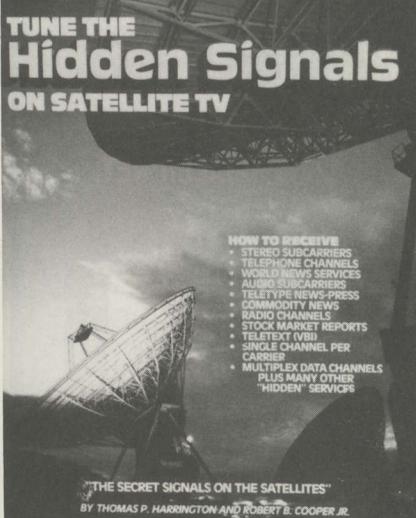
BALTIMORE battle between TVRO sellers and City Council, over proposed city ordinance to limit dish antennas to three or four foot maximum, becoming 'training ground' for lawyers interested in future of satellite communications. SPACE efforts have turned controversy into 'watershed' event and if SPACE wins this one, many other municipal barriers are likely to 'fall.'

FEDERAL Express has applied to FCC to interconnect via London with Europe for the satellite transmission of facsimile data (static documents reproduced electronically at a distant point). Firm expects to serve Belgium and most of western Europe at end of second year.

JAPAN suggests that by 1991, it will be ready to launch 'super satellite' capable of 60 to 70 transponders with up to 100,000 telephone/data circuits. The large 2 ton-plus vehicles would use switchable (at satellite) beams, all frequency bands from 4 to 30 GHz, and be capable of serving dishes down to under 1 foot in diameter.

HARRIS has gotten out of direct antenna manufacture, selling its Kilgore, Texas satellite antenna plant to management, as Vertex Communications. Harris will continue to market Vertex dishes, under Harris name, but Vertex will also offer product line to others as well. There has been marginal use of Harris 'Delta-Gain' TVRO antenna in consumer and SMATV field.

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EUROPEAN Grundig is establishing VHS VCR plant in China after having earlier licensed Chinese firm to build television receivers. Long term effects include possibility that China will one day be competitor in export market with Japan for consumer electronic goods.

BROOKS 'The Satellite Store' outlets should 'average' \$500,000 in retail sales each per year according to company data. Franchise fee is \$25,000, with \$5,000 per year paid for five years. Two percent of gross income goes to national advertising account, 5% to franchisor. Stores will ultimately sell 'private-labeled' TVRO terminals with Panasonic C band receiver systems **possible** stock item along with Hitachi VCRs, projection TVs and related video products.

SHIPPING COSTS for 10 or 12 foot screen mesh TVRO dishes, packed in containers in Korea, under \$20 each with delivery on either east or west coasts. Several US antenna suppliers are carefully studying possible Korean suppliers for consumer TVRO 'mesh antennas.'

FEBRUARY 8th is scheduled launch period for first of Arabsat birds; second was scheduled for May but will probably be delayed. May date also scheduled launch period for Mexican 'Morelos A' (first of Mexico's domestic birds) and Comsat/ATT Telstar 3D (T303 after launch) bird.

USSSI bird will locate at 122 west while SBS-5 will be at 124 west. USSSI wants to contract with Federal Express for ZapMail service and higher power requested would improve 'margins' for ZapMail receive terminals. Prior plans had been for 20 watt transponders.

CORONET, the Luxembourg 'paper company' trying to put together a Ku band 'open access' delivery system for European cable and private terminal viewing, moved small steps closer to actuality with commitment from Swedish group to option a pair of transponders. Coronet still long ways from hard plans, or funding required.

BRAZILIAN Embratel facing launch-insurance rates of 20% of cost of bird plus launch, suggesting insurers believe there is 1 chance in 5 the launch or bird will fail. Ariane will launch, with Arabsat, probably around February 8th.

SPACE wants legislation this year which does following: (1) gives home TVROs **immediate access** to scrambled services, (2) forces

'reasonable rates' for scrambled services, (3) bars (prohibits) premium service programmers from '**bundling**' programming (such as HBO proposes), thereby causing viewers to take (and pay for) services they do not want, to get those they do want, (4) bars (prohibits) cable franchisees from being **agents** for software (programming) inside of their cable service/franchise areas, and, (5) bars any system that limits to one (1) the **sources** for descramblers (such as M/A-Com is at present).

CANADA admits it has at least four years worth of Ku band transponder capacity 'in reserve' and it badly over-estimated market for transponders when planning for present Ku band birds.

PRESIDENT REAGAN has come out slightly in favor of allowing creation of private international satellite systems to provide alternate services to Intelsat. However, language of statement defends Intelsat right to continue to operate as 'monopoly' for such services as data and voice (telephone) and severely restricts types of business ventures private international bird operators could be involved with. Next step is up to FCC, or Congress.

IF Brazil and Arab satellites get off Ariane pad successfully early in February, next Ariane scheduled shot is mid-April when Spacenet 3 and Gstar 1 will go up.

COMSAT decision to shut down expensive plans for DBS (through subsidiary Satellite Television Company/STC) jarred many planning on the market for private 12 GHz terminals. Look for re-analysis by Alcoa and others who have been counting on STC to create market for hardware in this field during 1985/1986.

USCI, meanwhile, had planned on being 'bailed out' by Comsat/STC. Its 5 channel service limps along on Anik, serving fewer than 9,000 homes at present and facing shut-down whenever major investor, Prudential, tires of losses.

STATE of Indiana, threatening to shut down TVRO dealer/installers who have not been certified by state operated examination process, has turned to SPACE for help. State ran into very stiff opposition at hearings conducted late in November and wants to find 'peaceful solution' to problem. TV repair shops, and terrestrial antenna installers are presently licensed in exam process in Indiana.

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M/A-COM 'proud' of receiving order from Showtime/The Movie Channel for LinkAbit scrambling system. Showtime suggests third or fourth quarter 1985 for installation of encoder/decoder units. M/A-Com had been reluctant to 'turn on' Puerto Rico production facility for VC2C descramblers when only HBO had them on order. Showtime order gets M/A-Com over that hurdle. However, there is no common agreement by Showtime to offer their service to private TVRO systems; yet.

FRANCE, unpredictable as always, now says it will support a variation of British developed MAC (multiplexed analog component) scrambling system for satellite transmission. Basic C-MAC system devised by UK allowed for independent number of (digital) audio channels. France has opted, now, for D2-MAC variant which would have four-capable audio channels rather than 8 available in most widely recognized version.

FCC moving step closer to creating 'Mobile-Sat' communications system; has issued Notice of Proposed Rule Making which is first step to authorizing use of special satellite system(s) for communication between vehicular or hand held transceivers, via satellite.

SWISS company, Contraves, asking NASA to take 3.4-4 meter 'inflatable' parabolic antenna into space in upcoming Shuttle mission to 'test.' In near vacuum found at Shuttle trajectory height, antenna would 'puff up' under command and stay rigid, Contraves hopes, for duration of mission or as permanent antenna for Clarke Orbit satellites. Primary advantages are light weight, small transport space required, and relatively low cost.

PALAPA B and **WESTAR** 6 will apparently sell without much difficulty; unexpected interest in birds (both C band), largely from overseas, reported by insurance carriers representative who is handling 'auctioning off' of salvaged birds. Hughes performing study at present to determine extent of re-work (and expenses) required.

COMSAT announcement it was closing down 12 GHz DBS plans did not address future of twin-RCA satellites being built for dead-project. Several firms are interested although (six) channel capacity is seen as deterrent to many planned uses.

TESTS have finally pinpointed reason Intelsat V (flight 9) bird failed to achieve proper Clarke Orbit last June. Explosive charge, separating Atlas and Centaur 'stages,' created stresses in liquid Oxygen tank and 3 inch seam crack opened up. Insurance losses were over \$100M and next (F-10) launch is postponed until ground testing can assure it won't happen again.

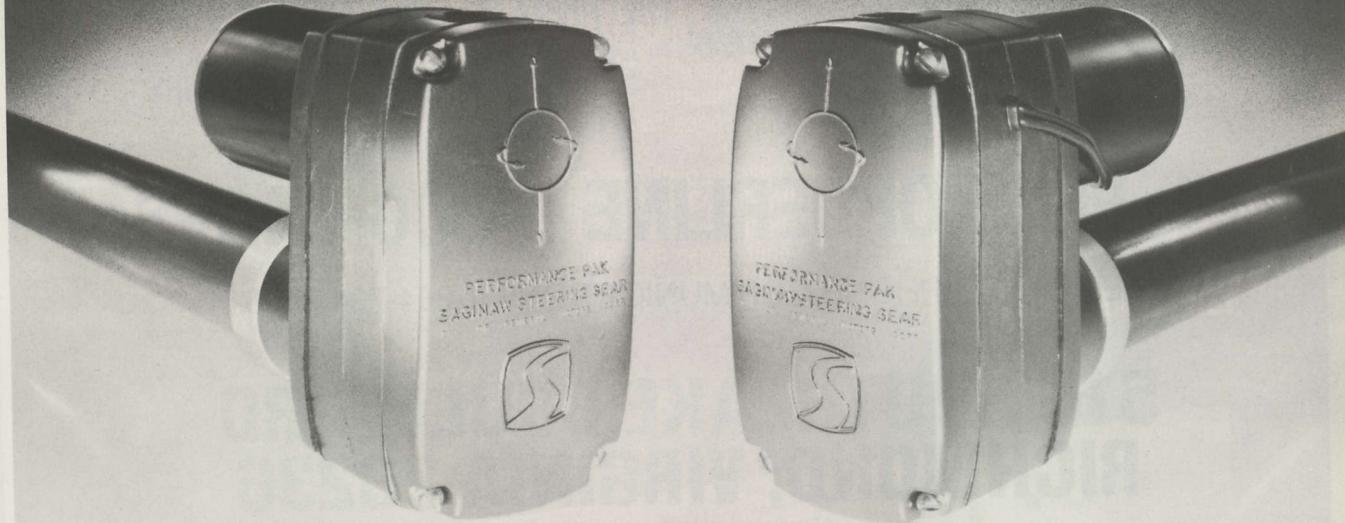
NOW apparent Japan will somehow purchase their first generation of 'private satellites' from a US supplier although second generation is likely to be 'home grown.' Several possible scenarios forming including Hughes with Mitsui and C. Itoh (they are trading company bringing DX receivers into North America), Ford linked up with Mitsubishi Electric and RCA in concert with Sony. Decisions likely before middle of 1985 but don't be surprised if no C band transponders are involved; Japanese opting for Ku or even Ka (20/30 GHz) transponders. C band in industrial Japan is virtually impossible in most locations because of proliferation of terrestrial microwave links.

EUROPEAN 'thinking' now shifting slowly away from need for high power (200 watt up) DBS type Ku band birds in favor of medium power (20-50 watt) birds. Improvements in receiving systems largely at work here; where in 1979 receiver sensitivity seemed to be limited by high front-end noise temperatures, latest breakthroughs in mass produced GaAs-FET technology at Ku band making far smaller dishes practical.

GALAXY is now only place you will find Nashville Network; after promising and threatening to shut-down Westar V feed, TNN finally did it late in November.

TED TURNER wants to establish 'international station' in Atlanta for direct linking, via Intelsat, to Europe and elsewhere. Turner says he

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wants to go out of USA on 4 GHz, have Intelsat (V) bird cross-strap him to 12 GHz, and come down in Europe on 12 GHz. FCC is considering request.

ARTHUR C. CLARKE attended premiere of '2010: Space Odyssey II' December 6 in Hollywood, preceding by one-day opening of movie nationwide. During visit to states, he met with Ted Turner whom he described as 'quite a fellow,' returning to Sri Lanka on December 18th.

COOP/ continues from page 6

business forever. Jimmy Long simply supplies a conduit through which the overstocked, the slow to move, and the downright junk can be flushed. If you lived on a farm and you had a septic tank, you'd be in a world of hurt if somebody wasn't willing to come along and empty your tank every now and again!

On the other hand (you knew there'd be one; right?) if you were operating a video specialty store handling say Panasonic VCRs and you walked into **K-Mart** one day and found **K-Mart** discounting your 'name brand' VCRs, then as a video specialty store retailer, you'd rightfully be ticked off. If you determined that Panasonic was not discontinuing the VCRs discounted in **K-Mart**, but was selling to **K-Mart** in huge volume at prices you could not touch yourself, then you would naturally be a bit angry with Panasonic. It would probably not even occur to you to be mad at K-Mart.

Not everything Jimmy Long sells is being discontinued. Some of the bits and pieces he sells to make up a complete system he buys on the open market just like you do; only he buys in the largest possible quantities in this industry because he is the largest volume mover of merchandise in our industry. Sure he gets better prices.

Most bits and pieces in a complete TVRO system are invisible. The LNA, for example, is virtually non-descript at the consumer level. But there are two parts of every system which the customer can identify by brand or model number; the antenna, and, the receiver. If Jimmy is handling a particular brand or model of **antenna** and he is discounting that product to levels you find difficult to compete with, where does it

say that **you** have to **continue handling that brand of antenna?** Any antenna brand you can find at Long's is seldom the 'best in its class' in our industry. There are numerous options open to you, as a dealer; antennas that work just as well or better, antennas which offer features and advantages you can tell your customer about when 'down-selling' products available from Long's.

As the editor for **Video Store** wrote, "**the moment a retailer confuses . . . specialist or volume discounter . . . he is tampering with his ability to continue in the marketplace.**" You are selling knowledge, service and expertise. That's one of the primary reasons why you pay \$75 a year to receive CSD 24 times per year; because we help you 'fine-tune' your knowledge, your expertise and hopefully your service.

Yelling loudly about discounters such as Long's will not make them go away. They, truly, are not in the same business you are in. To stay in business, you must sharpen your own skills and fine-tune your own perception of what it is you sell. Concentrate on selling service, knowledge and expertise and let Long concentrate on emptying people's overstocked warehouses. There's room, and need, for both in our industry.

Cable Television Business recently focused on the home TVRO field and how it relates to the cable television business. In a well written three page piece (November 01) they talked about how cable systems can be better businesses if they will change their **perception** of what it is they do. The cable system operators have developed just the opposite problem which **Video Store** wrote about; they have become such narrowly defined 'specialty stores' that they have been unable to focus on the **real product** they are selling; **entertainment**.

Modern cable management personnel are so brain and technique-washed that they believe the **ONLY** way people should get multiple choices of entertainment and education is through a piece of coaxial cable. **Business** tried to point out to their readers that the consumer of entertainment and information is not nearly as enamored with 'the cable' as they are, and that given **another choice** of how they would receive their entertainment and information, the consumer would not hesitate for a minute to 'change' if the factors were right.

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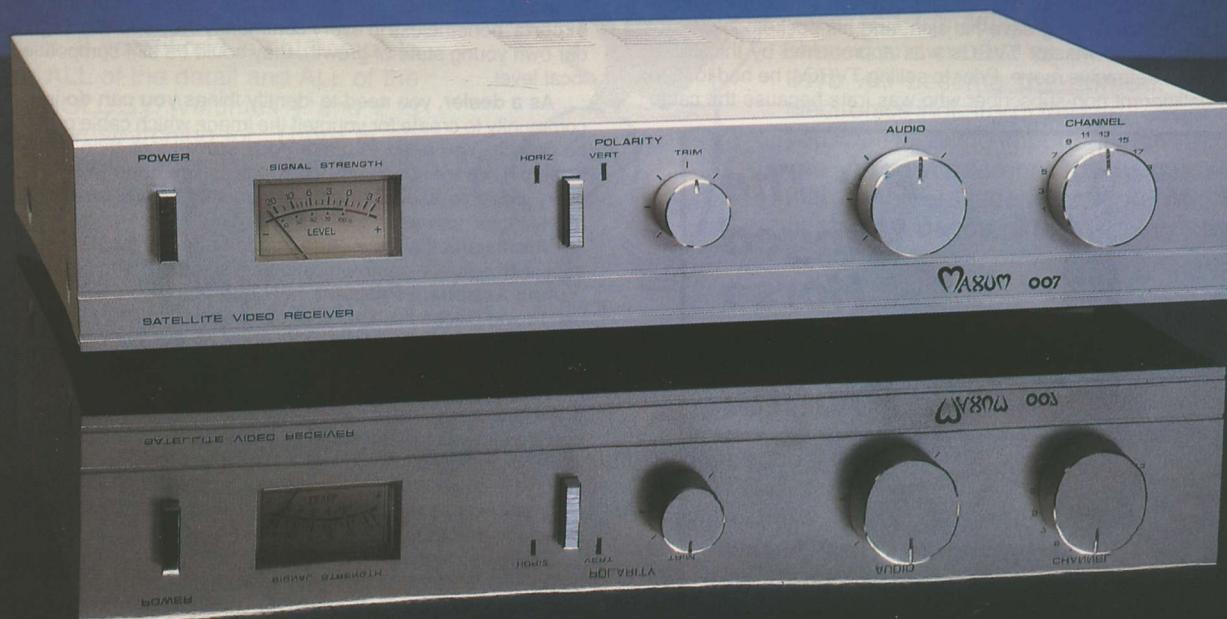
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Business reported on two different approaches to serving 'rural America' with multiple program choices. They accepted that once you leave the density of a town or city, there was no cost effective way to keep stretching cable lines into rural areas. One solution they offered was to treat small, isolated **communities** within their franchise service regions as 'SMATV' systems. They reported on one cable operator in rural Georgia who had built a cable system to serve a 387 home 'community' using a 90 foot telephone pole to support his local (off-air) TV antennas and a couple of consumer-grade TVRO antennas (and electronics) to bring in off-air signals; including a pair of premium channels. He found that he could wire together a 12 channel cable system in this way and serve those 60% of the homes that finally signed up for the 12 channel service for about \$350 capital construction dollars per home. His system is averaging \$19 per month revenue from those homes so in 18.5 months (\$350 divided by \$19) the operator has all of his capital investment back less his operating expenses along the way. That's not bad cash flow for a cable system.

Business also reported on a different approach taken by a cable operator in New York. The cable operator here has 35 separate cable franchises but the total number of homes in those 35 'franchise areas' only numbers 14,000. He has done the prudent thing in building his cable systems; he wires up those areas where plenty of people live, first, and then over the years he has put in 'line extensions' to pick up a half dozen homes here and ten there as the systems have grown. Still, there are many homes still unserved because he cannot afford to run his cable lines out two miles to pick up four homes.

His answer was to become a Channel Master TVRO dealer. He did this, he said, after 'being bombarded with complaints from several of the 35 franchise authorities he serves.' In effect, the franchising authorities were telling this man 'serve these people or turn in your permit.' The cable operator was caught between a rock and a hard place. TVROs are helping save his skin, and his pocketbook.

Selling Channel Master TVROs was approached by this cable operator as a defensive move. Prior to selling TVROs, he had to face down a belligerent non-subscriber who was irate because the cable

lines did not extend to their home. Now he uses the TVRO system as a 'substitute' for cable extension. When the non-subscriber gets loud and threatens to 'go to the city council' to complain, the cable operator offers them **an alternative**. For \$3,000 and some change, they can have 'their own cable system,' a TVRO. He has found quite a few 'takers' and it works because rural people already understand that running cable into their lightly populated areas is going to cost them far more than it costs 'in town' to hook up to the cable. In the cable business, a 'private line extension' (ie. extending a cable line beyond its normal route-end to serve one home) runs in the \$4,000 to \$6,000 per mile region. Thus, at \$3,000 (and change) for a home TVRO, anybody more than say 2,500 feet from the nearest cable-end is better off (in dollars) with a TVRO than he would be with a dedicated cable extension. Plus, as we all know, the TVRO gets them four or five times as many 'service channels' as does the cable extension.

Of course the very nature of our business is changing very rapidly. HBO has been telling cable affiliates that they should be in the TVRO business, selling HBO (and other) services. HBO personnel try to explain to cable personnel that it is '**NOT** the cable' that sells; 'it is the **PROGRAMMING**.' Or, how the stuff gets on the screen is only of small interest to the viewer.

Perhaps, for right now, we should all be glad that cable operators like the guy **Business** writes about in New York state are a rare breed of cable operator. **Suppose all** of the cable firms thought like he did, and **all** of the cable firms had showrooms filled with TVRO equipment? How would **you** like to be competing with that!

The cable operators have a reputation (good, bad or indifferent) in each community as 'the TV guys.' They sell the very stuff that **Video Store** describes as key ingredients of a specialty store; knowledge and service. They may be thin on knowledge in **our** field (for which we can be grateful) and thin on service because of their own management ineptness (for which we can also be grateful), but they are '**the experts**' nonetheless in every community they operate. Right now, in our own young state of growth, they could be stiff competition at the local level.

As a dealer, you need to identify things **you can do** in your own community to create for yourself the image which cable guys now win be default. You need to make **your store** more than just simply a display room for space age electronics. You need to be involved in every possible aspect of your community where 'space age communications' can solve some need.

This means that your store needs to be the focal point for every aspect of satellite communications. Your store should be the local '**Young Astronaut Program**' headquarters (see **CSD/2** for November 15 and December 15). Your store should willingly stay open long hours to feature special event displays on the 'big screen' of something of interest to a local group (the weekly and monthly guides are filled with such opportunities). **Make people know that you know all there is to know** about satellite communications. Make people know **you** are there as a major contributor to entertainment and education in your community and you will never have to worry about whether Jimmy Long has dropped his antenna prices \$50 or whether the cable company is appearing at yet another city council meeting to answer a complaint that they won't serve farmer Brown.

There has never been a better opportunity than the one you have before you. **Be smart enough**, and work hard enough, to realize your own goals and your own ambitions **in 1985**.

SPACE Dealer Progress

As I reported in **CSD/2** for December 15th, the **SPACE** 'dealer group' appears to really have 'their act together.' What I see happening here is a core group of perhaps 8 getting very much involved in the **SPACE** Dealer Board activities and another group of twenty or so ready, willing and able to do anything they can to get the dealer program off the ground.

It is difficult to access what they have done to date because the group is so new that we shouldn't be expecting results so soon. Still, there are signs and I'll share them with you.

The election of officers for the Dealer Board involved nominating people **from** the Dealer Board who in turn had been nominated **to** the dealer board this past August. The Dealer Board ends up with 19 members, but it has been structured so that virtually any dealer-



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CSD's 'Fifth-Birthday-TVRO' issue (October 1984) . . . telling the story of how the TVRO industry evolved, developed, and fought its way into the billion-dollar consumer world. Where the equipment came from, where the rules and regulations came from, how the industry leaders developed. This is the full story of all of the major points as our technology and industry developed. **From \$36,000** home terminals in 1979 to the **\$995** home terminals of 1984; **from 16 foot dishes** that did NOT move to 4 foot dishes that blend into the roofline. **From \$3,000 LNAs** to **\$99 LNAs**, the trials and tribulations and the big events that shaped and created an industry which many believe will become **the-number-one** consumer electronics industry of the late 1980's and 1990s! If you want all of the important facts, and an easy to use industry reference book, this special CSD Fifth Birthday Issue is for you. And the price is right; 180 pages, **\$15** shipping charges paid, worldwide.

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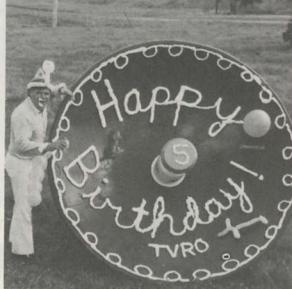
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member can participate in both the board meetings and the projects of the dealer board. One of the primary concerns of the dealer board is 'how do we raise money to pursue our projects?'. The present SPACE dealer membership fee is \$95 per year. That amount should stop no 'real dealer' from joining. The \$95 per year goes to the parent SPACE organization where some of it then trickles back down to the dealer board. A substantial part of the \$95 per year goes towards paying the costs of producing the 'Inside SPACE' weekly newsletter and the SATVISION (monthly) publications.

It surprised some that more than half of the \$95 per year is allocated to these two publications. Anyone from the publishing business could have warned SPACE (and probably did) that grinding out a weekly newsletter or a monthly SATVISION was a sure-fire way to eat up a big bunch of money in a hurry. Ultimately, there may be a better way to keep SPACE members informed of SPACE activities, even better than weekly; but that is getting ahead of the present state of technology and the industry.

Right after the concern about funding came the concern about the present SPACE 'Dealer Training/Certification Program.' The dealers were focusing on what they felt were the disappointments of the courses to date, but at that point had heard only the original Nashville sessions and had no way of knowing that overall the trend was to better course structure at the Dallas show. I heard the same complaints I heard after the Nashville show; the courses were too basic, or, the courses were too far above the heads of the real neophyte dealer. **Chuck Hewitt** told the Dealer Board "Because I hear about an equal number of complaints for both directions, I am assuming that we are probably right about where we should be; in the middle." He also suggested that ultimately, perhaps SPACE would have to field a pair of totally different courses; one set for the established (and therefore 'knowledgeable') dealer and one for the new or

'novice' dealer.

(I talked with Bob Luly about this during the Dallas show. Bob's opinion was that the biggest problem in the dealer training **at the moment** was to find 'skilled teachers.' He reported that his experience had been those who really understand their subjects well are unable to communicate effectively, while those who are at ease before a crowd and able to carry off an interesting explanation of the subject usually are not well enough versed on any given subject to handle questions from the floor or 'deviations' from the prepared course outline. I suggested to Bob, who was somewhat 'down' after hearing the complaints, that given time this would probably straighten itself out; we have raised an industry of innovators, not educators, and it will take a few more sessions before the educators rise to the top of the pile.)

The dealers were especially interested in the 'fall-out' from the recent M/A-Com - HBO - (scrambling) problems. They were briefed, in depth, on the status of the HBO scrambling system and the failure (to that time) of M/A-Com to deliver any meaningful number of cable (VC2C) descramblers to HBO for test. They were especially angry over the M/A-Com mailer tactics (see CSD/2 for November 15th) and voiced disapproval of any supplier who attempted to capitalize on the uncertainty of the scrambling situation in this manner. I did a 15 minute monologue on the subject for them and perhaps you have seen excerpts of this on 'Boresight' in the interim. I really didn't realize the 'Boresight' camera was running until I was finished since the subject was one of those "Please don't quote me . . . but . . ." topics. I later asked **Shaun Kenny** of 'Boresight' to check with me before using any of that material, and as November gave way to December approved 'Boresight' using some one-line excerpts from my monologue. I said nothing that wasn't explained in considerable detail in our December 1st edition of CSD and at that point saw no reason for it not to also be 'on the tube.' Of course HBO would probably not agree with that

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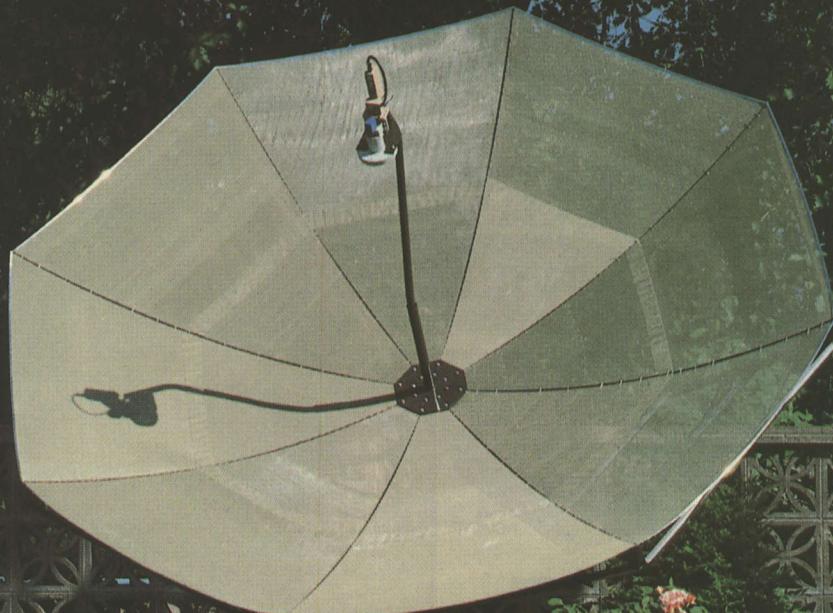
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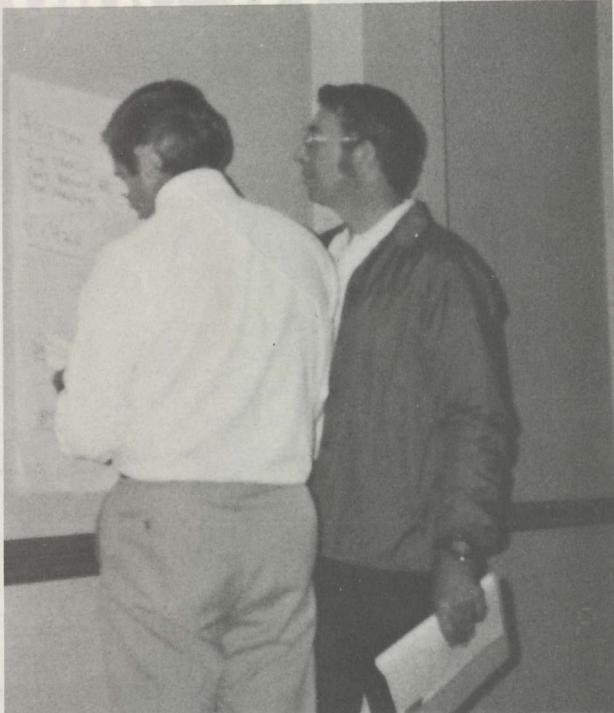
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decision.

One of the things I did notice about the Dealer Board group is that they circled their wagon train at the 'big board meeting' the following night and sat bunched together at one corner of the massive 50 person table. I can't blame them for starting out that way; afterall, they had no way of knowing what to expect at a 'big board meeting' and you also saw many of the distributors 'bunched together' and many of the OEMs 'bunched together.' There is safety in numbers. By being all together, this allowed them to 'caucus' as a group on all of the votes before the voting was done. The end result was that they voted as a group more often than not and I suspect that at least some of the votes (and elections to the 'big board posts') came out differently than had the dealers been scattered where they could not 'caucus' before each vote. Eight people voting in a 40 vote election is not enough to tip any scales, under normal circumstances, but when all 8 vote together it can (and did) make a difference. Now that they have their feet wet, I wouldn't be surprised to see them 'split up' to position themselves throughout the 'big board' crowd in future meetings.

If the future of this industry will lie with the dealers, we have what I perceive to be an excellent group of dealers presently serving on the SPACE Dealer Board. The only thing they have to watch out for is to avoid becoming a new 'clique' to themselves, intentionally or otherwise shutting out the outstretched hands of support and knowledge which those who are not on the board have to offer. The present leadership group is on the right track; now they need to work harder at bringing more people into the 'group' so that it doesn't turn into another strata of industry politics.



CHUCK HEWITT and I tally the votes for the SPACE Dealer Board on a hastily-arranged 'tote board.'

BIG BOARD Impressions

Our report on the Dallas STTI show and the companion meeting (and election) of new SPACE leaders in 1985 appeared in our CSD/2 for December 15th. I will not repeat the report here except to note that for those international readers who do not receive CSD/2, the new officers for 1985 are:

- 1) Chairman/ Taylor Howard
- 2) President/ Bud Ross (Birdview Satellite Communications)
- 3) Treasurer/ David Johnson (Paradigm Mfg. Co.)
- 4) Secretary/ Ted Anderson (Automation Techniques)

Individually, these are all fine, bright, dedicated people. As a

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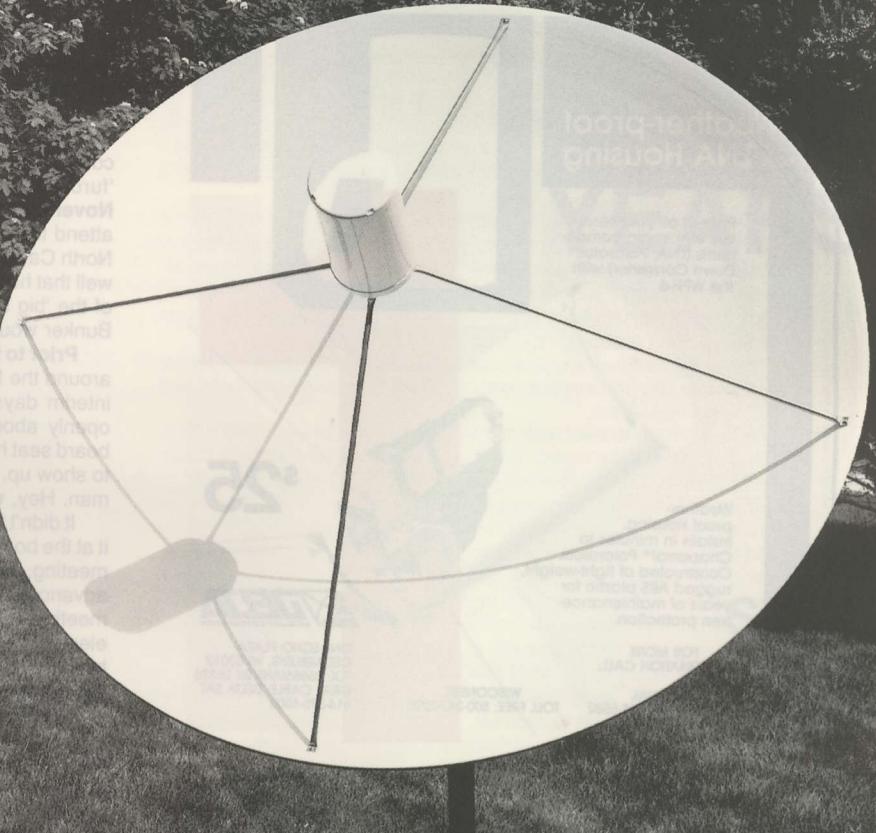
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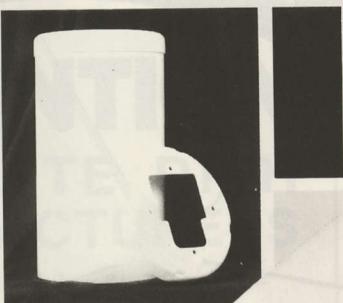
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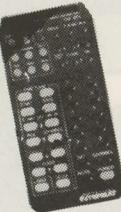
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group, they should form the most dynamic and **best balanced** quartet of SPACE leaders the industry has seen to date. Taylor Howard is a past-master at negotiation and if anyone can direct our industry to new successes during a transition year, it is Tay.

I was expecting the M/A-Com representative to the Board, **Phil Cox**, to show up with M/A-Com CEO **Jim Bunker** as a traveling companion. Bunker had told me prior to the show that because of the 'furor' over the M/A-Com promotional mailings (see **CSD/2** for November 15th), he thought he should rearrange his schedule to attend the Dallas gathering. He was scheduled to be at a M/A-Com North Carolina facility on Sunday the 18th and perhaps it was just as well that he did not try to accompany Phil since the marathon meeting of the 'big board' did not wrap-up until well after 1 AM on the 18th. Bunker would have had a dreary trip to North Carolina.

Prior to the Board meeting, all of the 'hallway talk' I heard centered around the M/A-Com mailing. Tempers had cooled somewhat in the interim days just prior to Dallas, and those who had been talking openly about calling for Cox's resignation from his newly elected board seat had backed off. That sounded good to me; Cox didn't have to show up, but he did, and that told me something (good) about the man. Hey, we all make mistakes!

It didn't take long for the 'old guard' and the 'newcomers' to get into it at the board meeting. Outgoing President **Peter Dalton**, running the meeting, wanted to change the agenda that had been prepared in advance; moving the election of new officers to the front of the meeting rather than the rear. The agenda clearly stated that the elections were 'at the end' because it was felt that by forcing the full board to work their way through the agenda, first, the newcomers and the old timers would have a better opportunity to judge the skills and abilities of those who were qualified to run.

Dalton was well down the road to changing the agenda when two people in the new group spoke out against what was happening. **Hans Giner** (Luxor) and **Doug Dehnert** (USS) both questioned the agenda change and from that came a substantial debate about the importance of both following the agenda and the wisdom of giving everyone there the opportunity to judge the abilities of those who were qualified to run. The new group 'won' on a vote and that set the tone for the meeting.

HBO was scheduled to address the board but not until Monday

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To: All Lowrance Distributors and Dealers
From: Michael Render
Subject: Possible Scrambling
Date: November 16, 1984

Recently, a glossy brochure was published and distributed to the trade, warning of "imminent scrambling". While I'm not sure of the purpose of this brochure, I'd like to clear up a couple of things:

1. **Scrambling is Probably Not Imminent** - While anything is possible, insiders I know feel that it is extremely unlikely that HBO et. al will be able to scramble in 1985.
2. **All past and present Lowrance System 70, or future receivers, will interface with the Linkabit decoder (and others).**
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3. HBO has assured us that MA/COM will not have a monopoly on decoder supply.

Summary: If and when HBO or other services scramble, Lowrance is ready.

ONE OEM REACTION to the M/A-Com mailer was this announcement prepared by Lowrance. It says that users of Lowrance receivers need not worry about the ability of their receivers to handle an external descrambler interface; if, and when, scrambling comes.

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morning. HBO had requested that their 'session' with the board be without any press present and of course that only heightened the speculation that some substantial, new, information was going to be passed to the board from Home Box. As we reported in **CSD/2** for December 15th, this was not the case and it would later turn out that the HBO presentation was more than a disappointment; many members of the board felt they had heard all they wanted to hear from HBO for quite some time.

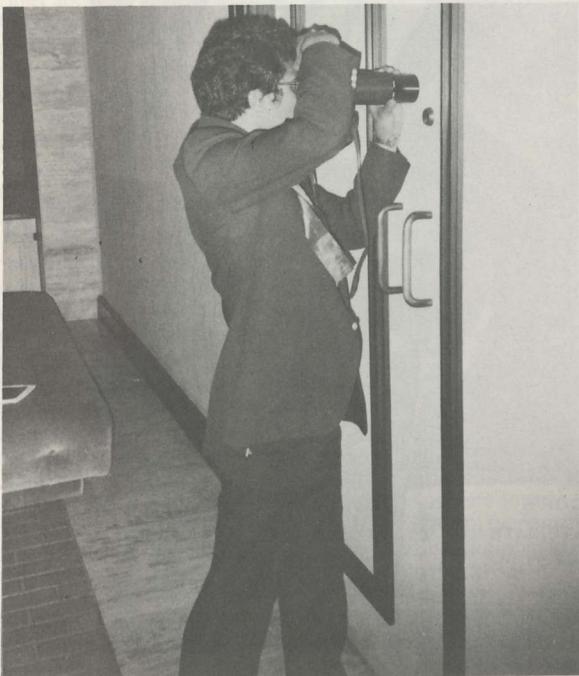
The M/A-Com mailer, once again, did not come up directly at the Board meeting although **Vincent Caputo**, of HBO, did allude to it in several spots during his discussion of scrambling-compatible equipment. I felt this was a mistake, on HBO's part. Since the M/A-Com board rep was not present at the Monday meeting, I saw no reason why HBO didn't stand up and clearly state:

"Hey, we had nothing to do with the M/A-Com mailing and we disavow any connection with their promotional efforts to sell C band receivers."

Alas, it was not said which again only increased suspicion that some members of the board carry; i.e. HBO and M/A-Com are much closer together than is generally being painted by HBO privately.

When the Monday board meeting broke up, there were numerous 'press conferences' by both HBO and the SPACE group. HBO told the press that they were still evaluating a 'C Band Business Plan' and nothing firm was yet ready to announce. The SPACE board told the press 'We will press ahead with legislative, legal and other efforts to insure that home viewers are not denied access to premium service programming.' Everyone was still at 'square one' if you could believe the press statements, or, what HBO told the board directly.

And, as I note separately here (in some detail), HBO is really between a rock and a hard place (or, 'The Devil and Showtime') on this entire program. I think the most positive thing we can say about it all is that there is every indication that for whatever reason or reasons, the TVRO industry just received a one-year reprieve from the 'scrambling sentence.' And now we need to go out and make the most of that 'opportunity' and plant another half million 'seedling' dishes in the ground while we have the chance!



PUBLISHER LLOYD COVENS/ attempts to 'cover' the HBO appearance before the SPACE board in a closed-door session. A tiny (1/4") crack between the doors offered a unique opportunity to photograph the HBO trio sitting at the head table. Lloyd is now studying lip reading in his spare time. While he was shooting his pictures, his big worry was that somebody would attempt to leave the room and slam the 300 MM lens up his nose!

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HBO/DBS 'Prologue'

In mid-December, several events relating to the proposed HBO 'CBD' marketing program occurred which will have some impact on the way scrambling finally shakes out during 1985:

- 1) STC, the Comsat subsidiary formed to create a 6 channel 12 GHz (Ku) DBS service announced it was **calling it quits**. Now some \$24,000,000 into the project, Comsat has decided that DBS is too risky a business and is calling it quits. STC was the DBS planner closest to creating a 'viable' 12 GHz business and with their announcement, the likelihood that there would be a 12 GHz 'DBS service' in North America much before 1990 all but disappeared.
- 2) Showtime and The Movie Channel announced they had signed a contract with M/A-Com to use the M/A-Com LinkAbit scrambling system. This is the **same** system HBO (Cinemax) had previously contracted to use and currently being tested on TR21 of G1.

The STC decision to kill their 12 GHz DBS plans immediately takes pressure off of HBO to beat STC into the marketplace with a 4 GHz 'CBD DBS' service. The Showtime decision to scramble Showtime and TMC transponders ('late 1985') takes additional pressure off of HBO to try to work out some sort of 'marketing accommodation' with Showtime. As noted here, HBO cares less about offering a 'package of services' which would **include** Showtime (or The Movie Channel) than they do that any premium channels remain unscrambled after HBO does finally scramble.

With STC 'dead' and Showtime now committed to scrambling, HBO has the luxury of sitting back and watching the C band terminal industry 'grow' into a world large enough to merit its own marketing operation and management 'tree.' My bottom line analysis does not change by these late events; we have still, as an industry, apparently bought ourselves 'another year' of unscrambled services and the opportunity for our universe (and political clout) to grow.

HBO + M/A-Com 'Shuffle'

When HBO sent a trio of representatives to meet with the SPACE

Board of Directors November 19th in Dallas, there was considerable anticipation on the part of many SPACE board members. "At last, they are coming to tell us when, and how, they will scramble" said one. "And, they will tell us what their marketing plans are and how our dealers can fit into that marketing program."

Expectations.

Alas, the HBO appearance was a disappointment. The HBO trio said nothing which had not been said before, as recently as Nashville when Ken Kinderman appeared on a panel to discuss **tentative** marketing plans. In the interim 10 weeks, HBO was apparently no closer to their final marketing plan, or a final scrambling time schedule.

The failure of HBO to 'share' their thoughts with the SPACE board had a re-enforcing effect. After the trio from Home Box departed, the Board discussed what their reaction should be. Ultimately, SPACE would approve an announcement which basically said:

- 1) **SPACE will proceed to push** for legislation in Congress which would force those services which scramble to offer their scrambled services to home TVRO owners, at a 'fair market price' (the **original** legislation introduced by Congressmen Gore from Tennessee, Rose from North Carolina and Tauzin from Louisiana in March of 1984);
- 2) **SPACE will proceed to prepare** for an 'anti-trust' attack on HBO (and other premium suppliers), in the court system, and be 'ready' to file anti-trust suits against the program suppliers if the suppliers act as if they will scramble without offering their services to home TVROs;
- 3) **SPACE will continue** to 'be available' to discuss possible marketing plans for 'CBD' service, with the premium program suppliers, as long as those discussions lead towards a 'level playing field' which allows all receiver OEMs to offer scrambling-compatible receivers and all (qualified) dealers to offer the service package to their customers.

As we saw in this space in December, the when-to-scramble-issue is a very complex issue. Many would like you to believe that the **only**



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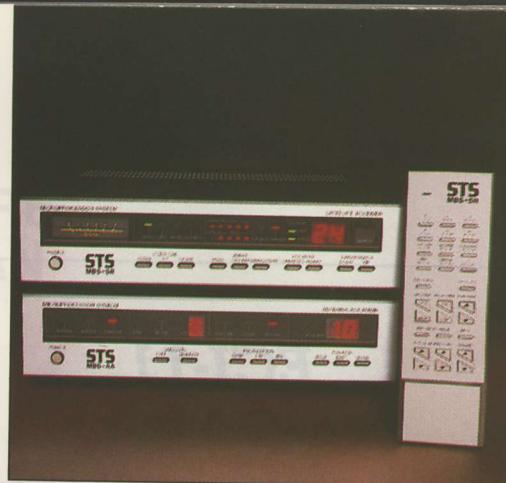
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factor impacting on 'when' is the delivery and installation of the M/A-Com created Videocipher scrambler and descrambler units.

As we explored on December 1st, HBO has a bit of a financial squeeze coming up; they have commitments for certain movies, to be released on HBO late in 1985 and thereafter, which are tied to significant dollars. They had planned that when these movies began to arrive at HBO for airing that there would be some certain (minimum) number of HBO (cable) subscribers on line. And, as we saw in December, those 'projections' for subscriber growth have lagged. In short, HBO is facing the use of some expensive movies and the way their growth has been going, they will have to pay more for those movies than they planned to spend.

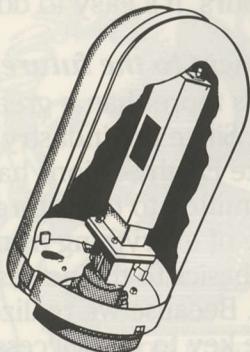
So the delivery of the first (second, etc.) VC2 scrambler for the Long Island uplink at HBO is not so important after all if it cannot be used to make more money for HBO. In fact, if it costs HBO money, and they derive no new (and much needed) income from its use, it is simply an artifact hanging around their neck. Ditto those 10,000 VC2C de-scramblers which they have said they will buy from M/A-Com. If they can't be used to earn HBO new cash receipts, what good are they? **Not much.**

In spite of all of this, HBO continues to issue great press releases claiming they 'will scramble' and then they tag a date or two on the 'will scramble' statement. The latest dates, should you care, wander between March 1st and September 1st.

I have attempted to diagram where things are **now**, and where they **might go** during 1985 and 1986. My diagrams are only as good as my information, and my information is only as good as the strength of HBO's internal planning. Their internal planning is, in a word, 'rubbery.' That is, just as the trio from HBO told the SPACE board of directors November 19th, "**We don't have our planning done yet.**" Right-on.

Still, there can be drawn some **assumptions** relative to how things might happen, in what sequence and with some approximation, 'when,' given what we do know about the progress to date. I suspect that every six months or so into the indefinite future we will be doing this sort of 'diagramming' again (and again) as the influences change and the entire program matures. This is not to say that we don't know what we are talking about 'this time'; quite the contrary, there is only so much **to know** and therefore only so many logical conclusions can be drawn from the limited amount of knowledge that exists. And as long as HBO continues to **not-know themselves** what and when they will be doing certain things, there is also no way that we can know anymore than they know. You simply cannot start playing a 'new game' when **nobody** has adopted the rules for the game; yet.

When it was all over, the meeting was a disappointment; a let-down. Not only did the SPACE board not learn anything new, but there was the suspicion that HBO was withholding information which could have been shared with the board without jeopardizing HBO plans.



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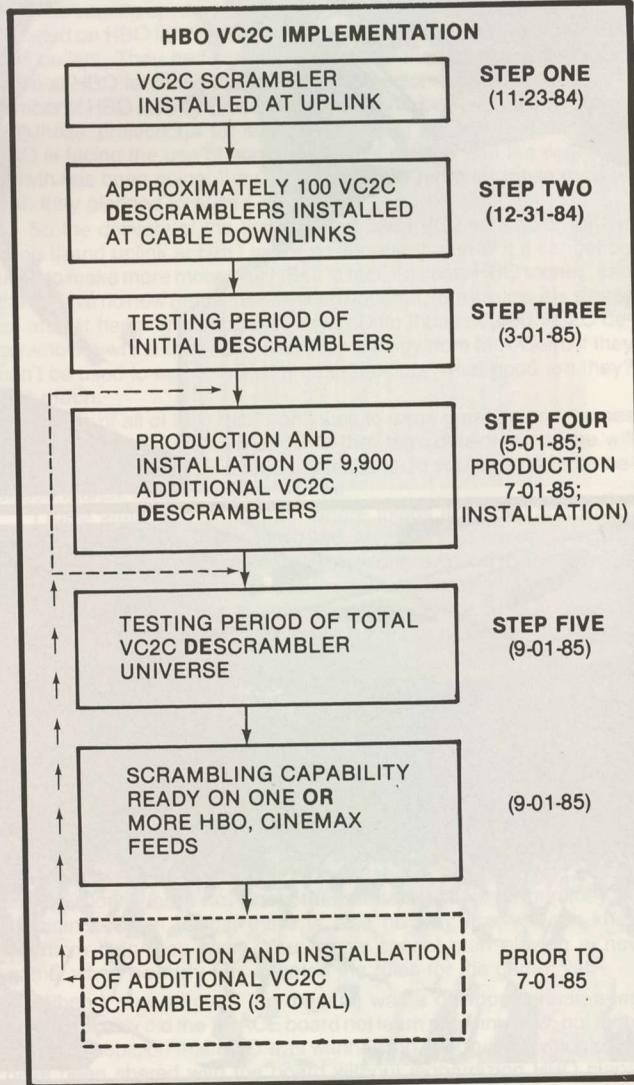
As I wrote at some length in this space for December 01, HBO's plans are 'problem-driven.' A minor update or two.

- 1) The first of the VC2 scramblers was finally hooked up and put into an operating mode late in November. This gives HBO the tools needed to scramble one channel of service for test purposes. You may recall that I also reported, in December, that HBO can scramble a single line (in the vertical interval) to test the scrambling package which means they can test without having to tear up the pictures on a regular service channel. You won't know they are testing unless you have the appropriate 'waveform monitoring equipment.'
- 2) The first quantity of descramblers, the VC2C (cable) version, were delivered to HBO on November 19th. There were 101 of these units in the first shipment and most have been distributed to a number of western cable television system headends where many are installed as you read this. Testing, using the vertical interval line, is underway.

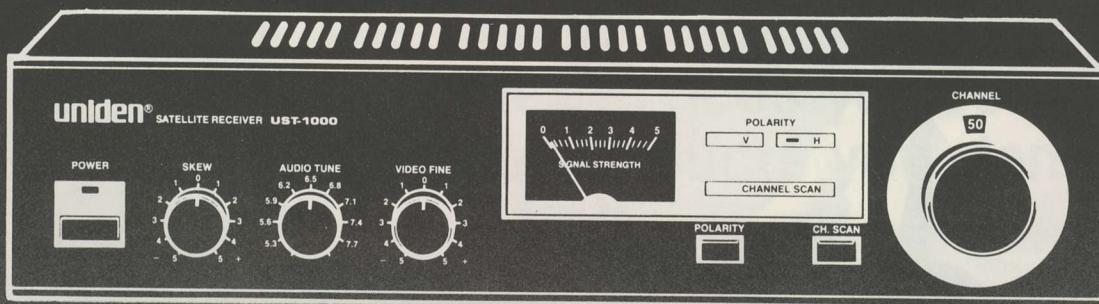
Thus M/A-Com and HBO have met their announced deadline of having 'some' descramblers installed at 'some' cable headends prior to December 31st. And that is supposed to tell 'us,' as well as everyone else that is concerned about such things, that 'scrambling is coming — soon.' **And that is all crap.**

VC2C Implementation

Our first diagram shows the probable sequence of events relative to the recently installed VC2C scrambler (that's the piece that goes at the uplink). It was made operational November 23rd. At the same



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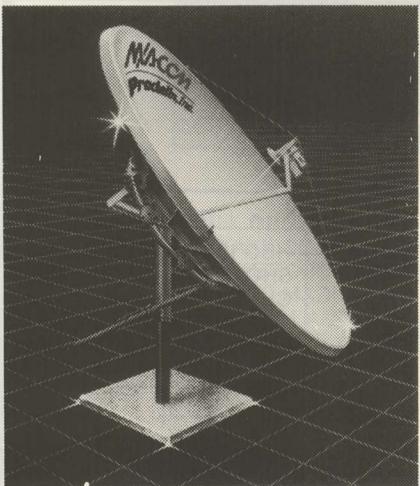
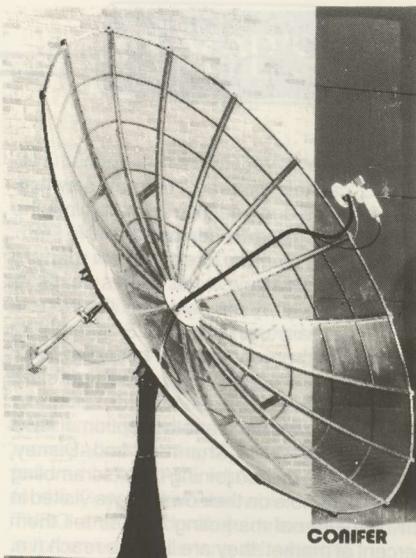
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COOP/ continues from page 72

time, HBO was distributing the first shipment of VC2C descramblers (101 units total) to cable headends. That brings us to today and the testing that goes on with some degree of regularity using that single scrambler and those 101 descramblers. Remember that the testing is being done in the vertical interval test signal (VITS) so you cannot tell that they are testing it; it is NOT like the testing that was done for eight months or so on transponder 3 of Galaxy 1 where the video was totally messed up. Let us assume (as in forecast) that this testing will continue until around the 1st of March. At that point, the test results are analyzed and a decision has to be made:

1) Testing proves the system worked properly and it is now safe to move ahead with the installation of additional scramblers (for the remaining three HBO + Cinemax transponders) as well as approve M/A-Com releasing the remainder of 9,899 VC2C descramblers. We make this assumption in our diagram and suggest that between the approval of the test results (March 01) and the final delivery of the **balance** of the scramblers and descramblers we eat up four more months; **taking us to July 1st.**

Once the balance of the scramblers and descramblers are installed, we have a new test period. We are suggesting in our diagram that this will consume no less than sixty days which places us at September 1 (1985) as the **earliest 'start date'** when HBO could throw four switches and scramble HBO east and west as well as Cinemax east and west.

All of this is mechanical, and does not deal with 'why' HBO would want to scramble HBO east and west and Cinemax east and west if that scrambling did not give them new revenue sources. However, they must get through the mechanical phase (i.e. **be ready to scramble** by throwing switches) **before** they can seriously address the marketing aspects of selling their service(s) to home TVROs.

HBO Marketing Options

On the assumption that all of the testing goes OK, that HBO does not have a major falling-out with M/A-Com, we arrive at approximately

the 1st of September with HBO 'capable' or 'ready' to throw a switch. Now the project moves away from the engineering realm and into the marketing region. This is where the **real fun** begins.

In our '**HBO Marketing Options**' diagram, we see them ready to throw the switch(es) on September 01. Now, what comes next?

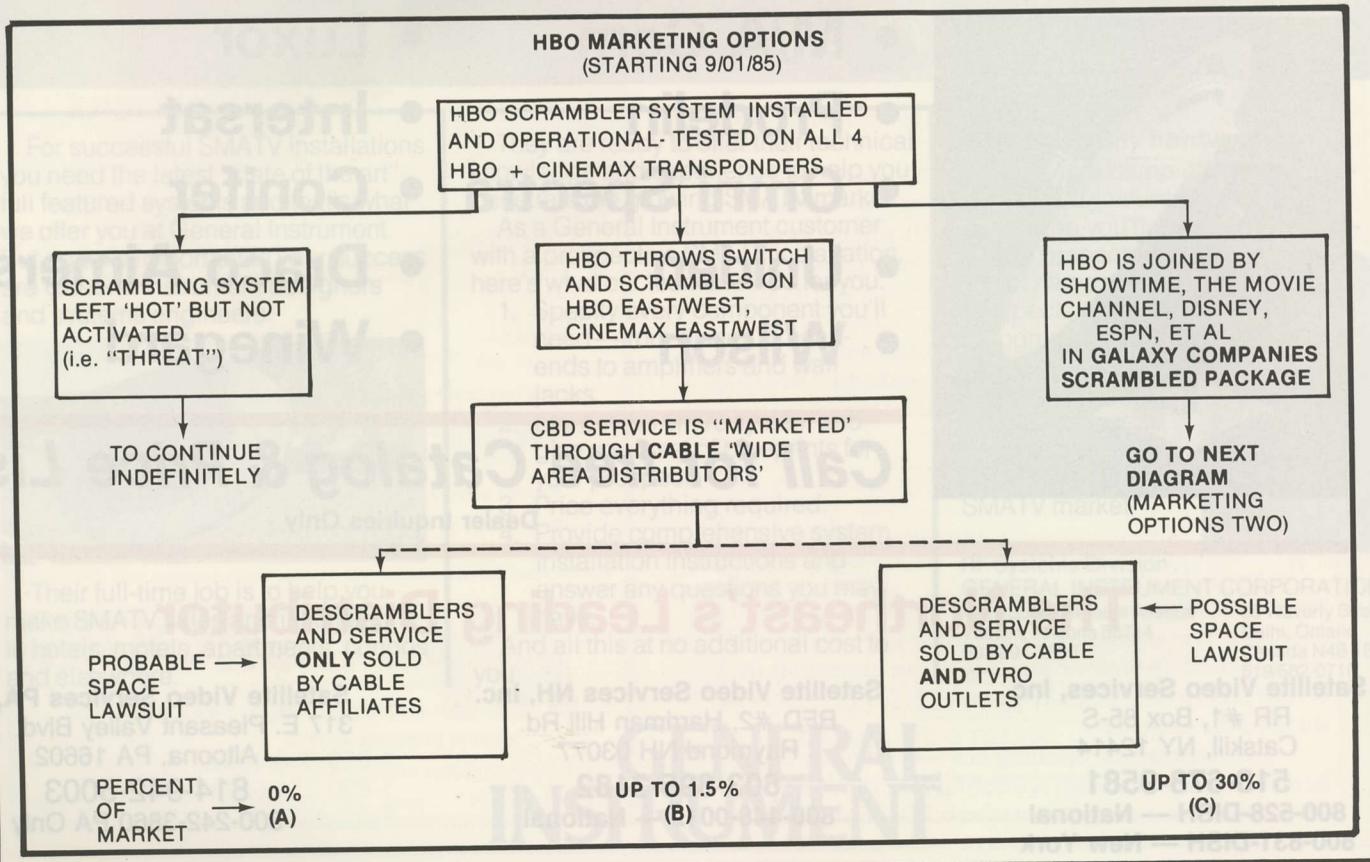
On the left, we have one option: they simply leave the system installed, test it every now and again using the VITS scrambling technique, and do nothing else for some indefinite period of time. That's the '**sword over our head**' scenario; they could, on short notice, scramble anytime they wished.

Then in the middle of the diagram we have another option. If HBO is **not** able to talk Showtime (+ The Movie Channel), and, Disney, Turner Cable Services, ESPN and so on into joining their 'scrambling party,' they could go ahead and scramble on their own; as we visited in December. However, their own internal marketing studies tell them that if they do this, their 'percent of market' they are likely to reach (i.e. sell to) would be very small; probably no more than 1.5% of the total TVRO 'universe.' Still, they **could** do this (and **lose money** servicing those 1.5% of the marketplace) because that would be 'a start,' and having done it, they **might** be able to talk other services (such as Disney) into scrambling as well. Adding Disney, for example, might pick them up another 0.5% of the marketplace and at this stage every little bit of boost would help.

Finally, there is the third (on right) option; by some miracle Showtime (et al) decide to 'join' HBO in the CBD marketing program and we have the 'promise' of something HBO calls '**The Galaxy Companies Package.**' That's where we have between 6 and 9 scrambled channels of Galaxy, all using the same scrambling system, and all (somehow) being offered as a single 'package' of channels through a single marketing source. And that gets us to a new, more complex diagram.

HBO Marketing Options/ Two

We are still at September 01 (1985) but now we have some positive indication from Showtime (et al) that they will join HBO in this plan. HBO has the scrambling system installed and it works. They demonstrate it to the doubting-engineers at Showtime, The Movie Channel, Disney and so on and these engineers report to their respec-



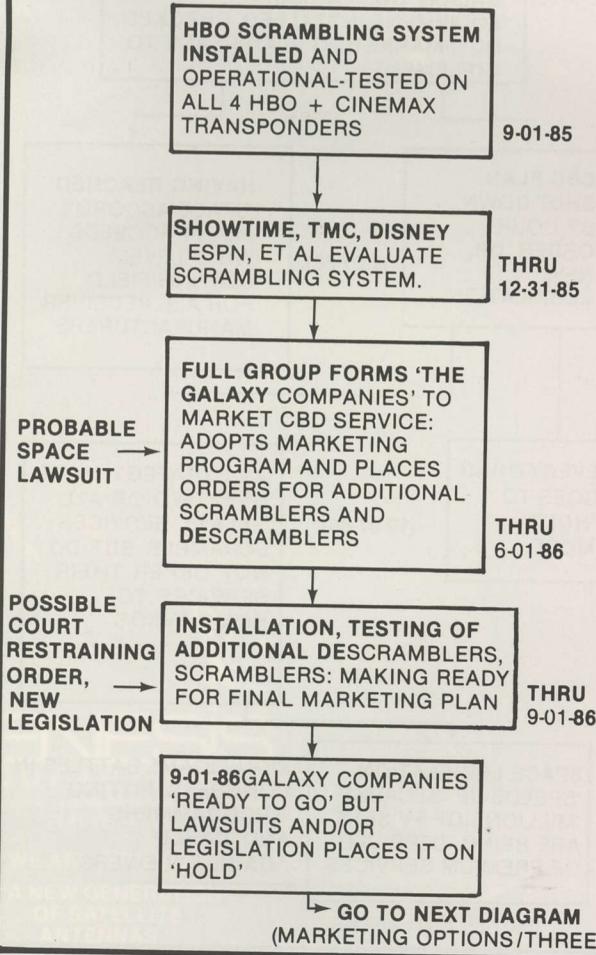
tive managements that they love the system. Or, at least can tolerate the system.

Now they all get together (**anti-trust** concerns from the Department of Justice aside, for now) and try to create a common marketing plan as well as agree on how they are going to split up the 'TVRO dollar pie.' Naturally every service involved will be after the maximum bucks-per-home per-month so you can envision some interesting, drawn-out hassles here as each participant battles for his 'fair share.' Let's assume that this process takes four months and now we are, as diagrammed, to December 31st. At this point, HBO and Cinemax have **not scrambled** themselves because to do so, alone, will earn them such an insignificant amount of additional income that they will lose money administering that new (TVRO/home) revenue. And, were they to scramble, SPACE would be all over Congress pushing even harder for the 'Gore Legislation' which will (if adopted) force them to deal with TVRO under federal guidelines. They would like to avoid federal involvement for as long as possible.

So here we are, at the end of 1985, and still nobody is scrambling. But, in this optimistic scenario, by the end of 1985 we do have some sort of agreement from the Galaxy program participants that there will be a universal scrambling system and a universal 'marketing approach' to selling a descrambled service.

Between the end of 1985 and the first of June in 1986, we can project that all of the participants in this 'ideal scenario' will be working out the details of the distribution plan, and, somebody (such as M/A-Com) is busy tooling up for, and then delivering, the additional thousands of descramblers and the additional uplink scramblers that will be required. And now we are almost to the middle of 1986.

HBO MARKETING OPTIONS TWO (STARTING 9-01-85)



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Along in here you can anticipate that SPACE will be in court as well as pushing for the adoption of legislation guaranteeing TVRO owners the right of access to the scrambled transmissions. It is probable that someplace in here either a court will issue a restraining order shutting down the scrambling plans, or, the Congress will pass legislation making mandatory access to the scrambled programming practical. SPACE is certainly on record as planning to do all of this (and more) and HBO is smart enough to take SPACE at their 'word.'

Still, if the 'coalition' of Galaxy programmers holds together through all of this, we could have the additional services (Disney et al) testing their scrambling system by the summer of 1986 and we could have those tests completed by the 1st of September in 1986. At that point, if the Galaxy Companies are bound and determined to scramble, but not to allow TVRO dealers to be a part of the distribution plan, you can be quite sure that some court will stop it at that point. So even with everything falling into place, with the best possible meshing of gears, we still end up early in the fall of 1986 with no scrambling in place; unless along the way the Galaxy Companies have 'made peace' with SPACE and have agreed to a selling and marketing plan which includes our industry's OEMs and dealers.

Which gets us to 'HBO Marketing Options Three.'

HBO Marketing Options/ Three

If we somehow arrive at the best possible scenario (September 01, 1986) with everything in place, we have a new set of scenarios.

On the right, everything has been resolved and now, finally, some 20 months down the road from today, there is a Galaxy One CBD service available. And everyone, one supposes, is more or less

happy.

That's the optimistic viewpoint. To the left in our diagram, we have the CBD plan being shut down by a court or being substantially modified because in that 20 months SPACE has been able to push legislation through Congress which forces the premium (scrambled) services providers to deal with TVRO users and sellers on a 'level playing field.' SPACE will argue that by allowing the cable firms to control the distribution of CBD service, and equipment as well, there is a 'cable industry monopoly' in place which works to the disadvantage of the TVRO industry. Even if the cable affiliate, operating as a 'Wide Area Distributor' for the CBD service, does 'allow' some local TVRO dealers to 'install' the equipment, the very fact that the 'Wide Area Distributor' is a cable operator makes it difficult for the TVRO dealer to offer CBD service 'in town' in competition to the cable operator's own service lines. SPACE will focus on this and will show that a growing percentage of the TVRO sales are occurring 'in town' where customers are opting for TVRO service rather than cable service. The cable operators would like to slow down or stop this trend, of course, and by controlling in their area the distribution of CBD descramblers, they could certainly slow down the sale of TVROs 'in town.'

So SPACE will be battling not only the premium suppliers but the cable industry as well. And twenty months down the road from today, that could be a very significant battle indeed. It could, as the diagram shows, force everything to 'go on hold.' Or, as a strategy move, HBO (and/or others) could elect to finally throw the scrambling switches. Of course when they do this, the legislation introduced way back in the

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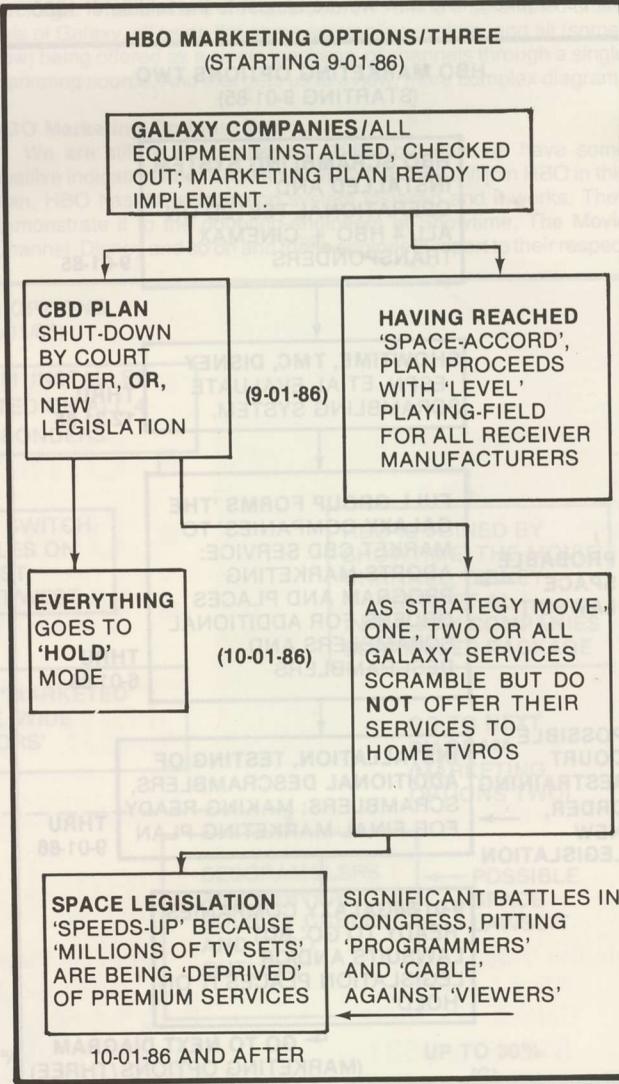
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spring of 1985 will gain new momentum because this is exactly what that legislation is **designed to prevent**; scrambling of services without offering descramblers to individual home TVRO owners.

And so we come to the end of this diagram with the notation that we now have a battle raging in Congress; pitting the programmers and cable industry **against** the home TVRO owners.

TIME-TABLE String

The 'strength' of the TVRO industry will rise as the number of home terminals grows. The number of terminals now 'in place' is unknown. During 1985, because SPACE has begun a statistical analysis program, we will at least have a better concept of how we are developing. But the number of terminals in place, as that statistical analysis program begins, will never be known.

In our final diagram, we assign some numbers to the 'size of the TVRO universe' at various points along the time-table through September of 1986. We make the assumption that there are 700,000 terminals in the ground and operating on January 1st and project growth through September of 1986. We see slightly more than a doubling of our universe in that period of time.

Starting at the top, while HBO is testing their single scrambler and their 101 initial descramblers, we see SPACE formulating the final plans for their legislative and legal options. SPACE will be introducing, with the help of Senators **Goldwater** and **Gore** and Congressmen **Rose** and **Tauzin**, two significant pieces of legislation early in 1985:

- 1) A bill to pre-empt local zoning ordinances which attempt to keep TVRO antennas out of a municipality (Goldwater will sponsor and push this one), and,
- 2) A bill to make it mandatory that when a premium service scrambles, it **must offer** its scrambled services to individual (home) TVROs for a 'fair market price.'

SPACE will also be revisiting the 1982 plan to bring an anti-trust suit against the premium suppliers, HBO in particular since they are leading the pack, and while this suit would be substantially financed by the 'Super-Fund' group (within SPACE), it will be offered as the 'will of the full board' this time around. Every step HBO takes, in announcing their CBD program, and in setting up the distribution of their program-

ming through HBO appointed 'Wide Area Distributors,' will be very carefully scrutinized by SPACE. Every 'mistake' HBO makes in this process will be additional ammunition for SPACE in the anti-trust suit, as well as in arguing before Congress the **need for** adoption of the 'mandatory access' legislation.

While the two camps are jockeying for position, HBO will be winding through the test phase for their first descramblers and reaching a decision regarding installation of the balance of the descramblers and scramblers.

Through all of this the TVRO universe grows, perhaps not as rapidly as many would hope, but by the fall season of 1985 most feel it will have achieved the mythical 50,000 per month level as a conservative estimate. All of this tells us that as the TVRO universe grows, and HBO takes longer and longer to scramble or drag the other premium suppliers into their scrambling plans, the number of Americans 'impacted' by the ultimate scrambling format is growing; substantially. **This works for both sides.**

HBO would like to have several million potential customers for their service, when all of this sorts out. SPACE, representing those several million users, would like to have everyone of them writing or calling their Congressman when the final votes come in Congress. Size, a big TVRO universe, may be the only common aspiration the two share.

Synopsis

As always, in the HBO scrambling story, we are no closer to firm dates nor firm action than before. But we are at least **now able to focus** on the reasons **why there can be no firm dates** and we are finally able to step back from the equipment (VC2 scramblers and VC2C descramblers) question to see that equipment availability, and delivery, is but a small consideration in this scenario. Yes, certain things must happen with the equipment **before** other things can happen. But even **after** those things **do happen** with the equipment (i.e. it is proven, in place, and ready to 'work'), we are still not to a point where a hard set of dates can be forecast.

Will HBO and the scrambling question be 1985's number-one 'continuing story'? We think so.

MAJOR EVENT TIME-TABLE STRING

PROBABLE TVRO UNIVERSE		
700,000	1/1/85	ONE HBO CHANNEL SCRAMBLE-READY; 101 DESCRAMBLERS UNDER FIELD TEST
730,000	2/1/85	
900,000	7/1/85	BALANCE OF VC2C DESCRAMBLERS INSTALLED
975,000	9/1/85	HBO DECISION TO SCRAMBLE ONLY HBO + CINEMAX, OR, BRING-IN OTHER GALAXY PROGRAMMERS
1.15M	12/31/85	OTHER PROGRAMMERS EVALUATE, THEN ADOPT CBD/GALAXY PLAN
1.4M	6/1/86	CREATION OF GALAXY COMPANIES 'PROGRAM'; DELIVERY OF SCRAMBLERS AND DESCRAMBLERS
1.5M	9/1/86	POSSIBLE START-DATE OF GALAXY COMPANIES MULTI-SERVICE SCRAMBLED PACKAGE
		SPACE ADOPTS LEGISLATIVE AND LEGAL PLANS
		SPACE INTRODUCES GOLDWATER 'ANTI-ZONING' AND GORE 'ANTI- SCRAMBLING' LEGISLATION
		IF ONLY HBO + CINEMAX SCRAMBLE, PRESSURE IS OFF SPACE; IF OTHERS ON GALAXY 'ACT LIKE THEY WILL SCRAMBLE,' LEGISLATION 'SPEEDS UP'
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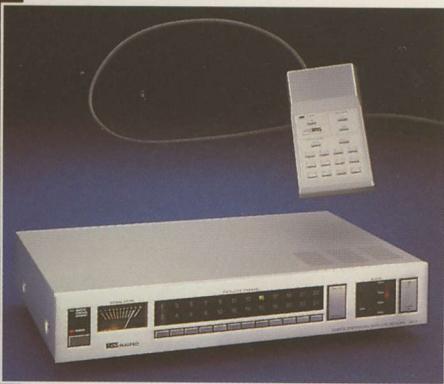
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